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OF
CHICAGO

JUNE, 1917

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WITH 70 ILLUSTRATIONS*

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SURGICAL CLINICS OF CHICAGO

Volume 1

Number 3

CLINIC OF DR ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

PULSION DIVERTICULUM OF THE ESOPHAGUS—CURE BY THE SIPPY-BEVAN OPERATION

Summary Pulsion and traction diverticula of the esophagus mechanics of their production signs and symptoms of esophageal diverticulum danger of confusing with stricture—how to differentiate treatment dangers and sequelæ of the older operations technic of the Sippy Bevan operation, the after treatment

I DESIRE to show you a very interesting case which has been referred to my service by Dr Bertram Sippy with the demonstrated diagnosis of pulsion diverticulum of the esophagus As you know there are two forms of diverticula of the esophagus—the pulsion and traction diverticula The first the pulsion is the one that interests surgeons a great deal while the traction diverticula are surgically of but little interest They are usually well down in the thorax and are the result of a contraction of scar tissue about the esophagus especially chronic inflammatory processes such as tuberculosis in the mediastinal glands By this contraction the esophagus is deformed and a portion of the wall pulled outward forming a diverticulum Usually the defect is not great and does not require surgical treatment, as a matter of fact it is as a rule not amenable to surgical treatment

Pulsion diverticulum occurs constantly at the same point just as does an inguinal hernia This is true because there is a weak point in the esophagus or, rather, at the junction of the esophagus with the pharynx, as represented in the plate which I show you (Fig 183), where there is a divergence of the muscular fibers, leaving a small triangle uncovered by muscle, and where the mucous membrane and submucosa can, under pressure, be forced

out as in a hernia. In the process of deglutition a good deal of pressure is brought to bear upon the walls of the esophagus and pharynx, and sometimes, at this weakened point, the tissues give and a hernial projection gradually develops, sometimes forming a pouch the size of an egg, or sometimes a pouch that will hold, in extreme cases, a half-pint or a pint or more of fluid (Fig 184)

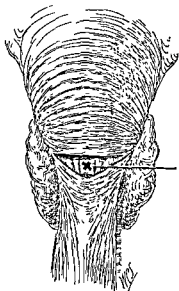


Fig 183—Weak spot in posterior wall of esophagus at about the level of pharyngo-esophageal junction, marking the site of all pulsion diverticula of the esophagus

The clinical picture is a very striking and sometimes a very distressing one. When the pouch is small, little or no difficulty may arise. As it increases in size, however, a considerable amount of food passes into it and decomposes, producing marked irritation, and is regurgitated. As the pouch enlarges, it tends to encroach more and more upon the esophagus, and eventually conditions may arise such that, after the pouch is filled with food, it is impossible for the patient to get anything through the esophagus into the stomach. In extreme cases these patients die of starvation. The diagnosis can be made by the history of

difficulty in swallowing and regurgitation of food and liquids, sometimes food is retained for some time in the pouch, and when regurgitated shows marked evidences of decomposition. When the diverticulum is large and filled with food one can sometimes see a swelling in the neck which rises and falls with deglutition. When the diverticulum contains food or liquid and air, succussion sounds may be elicited, just as in a stomach partly full of liquid and partly full of air. On passing a sound the sound usually goes into the pouch and is stopped at the bottom

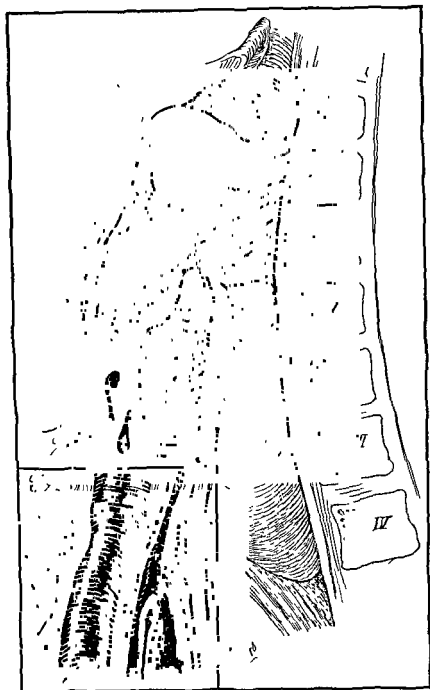


Fig. 184 —Diagram illustrating the location of esophageal pulsion diverticula with especial reference to the mechanism of pressure-occlusion of the esophagus when a diverticulum becomes distended with food. Insert. Sagittal section of esophagus at point at which diverticulum arises. The mouth of the diverticulum may exceed the esophagus in circumference and may lie in the direct line of the esophageal lumen so that everything introduced into the esophagus passes directly into the diverticulum and is regurgitated, thus simulating clinically a complete obstruction.

of the pouch, leading often to the diagnosis of stricture of the esophagus. If, however, the patient swallows a string, a large bougie can be threaded over this string and passed through the esophagus without difficulty, showing that no stricture exists. A graphic demonstration of the diagnosis is made by having the patient swallow a barium or bismuth meal and then taking an x-ray picture. This will show clearly the outline of the diverticulum filled with barium solution.

Many of these cases have been operated upon, and in the early history of these operations the mortality was extremely high. An improved technic, however, has reduced this mortality considerably, but still the operation is one that carries a good deal of risk: first, because it is often done when the patient is weak and emaciated from partial starvation; second, because many operations are followed by pneumonia, third, because many of them are followed by local infection, which may lead to mediastinitis, general infection, and death. Within the last few years I believe that we have in this clinic improved the operation for this condition by the development of a technic which I shall use in this particular case.

This patient is in very good general condition and is a good surgical risk. I shall do the operation under a general anesthetic. In some of our cases the patients have been so weak or so nearly dead from starvation that it has been necessary to do a gastrostomy first and feed the patient for some weeks before undertaking the operation. Where the patient is not a good surgical risk I think the operation should be done under local anesthesia. This we have done very satisfactorily.

TECHNIC OF OPERATION

I shall make a long incision over the sternocleidomastoid of the left side from the clavicle to the angle of the jaw (Fig 185). This divides the skin, superficial fascia and platysma, and the deep fascia. The sternocleidomastoid is now drawn to the outer side and the omohyoid muscle comes into view. In this case, as you see, this is a broad muscle. I shall clamp it with two clamps and divide between them. Now I expose the thyroid

gland and the covering of the trachea, and find a large artery crossing the esophagus to reach the posterior surface of the thyroid gland. This is the inferior thyroid artery, and I very carefully isolate it, clamp it at two points, divide between the clamps, and ligate each of the cut ends. This enables me to push the thyroid medianward, while with a blunt retractor I



Fig 185 —Location and extent of incision and necessary dissection for exposure of diverticulum

carry the carotid artery and internal jugular vein laterally and expose the upper part of the esophagus. With a blunt dissecting forceps I now pick up the upper part of the diverticulum, using great care not to rupture it. Arming my fingers with a piece of gauze I gradually draw this large sac up out of the thoracic cavity and into our field. You see that this dissection has to be

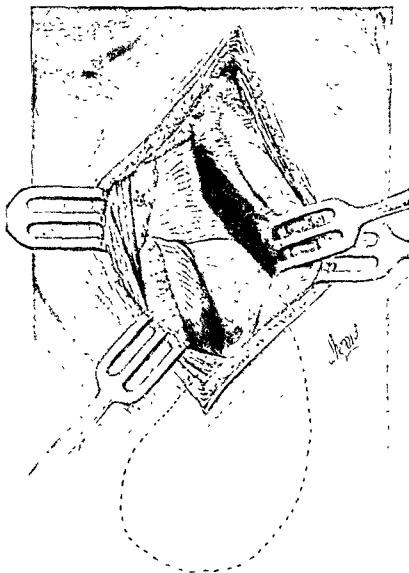


Fig 186—Location and extent of incision and necessary dissection for exposure of diverticulum.

made very carefully, and it has required in this case fully eight or ten minutes to free the sac and bring it completely out of the

wound I show you a large sketch of this part of the dissection in (Fig 186) which you see in this chart The sac is composed of mucous membrane and submucosa and has no covering of muscularis

In the early history of these operations a number of schemes for obliterating the sac were tried All of them involved cutting off the diverticulum and sewing up the opening thus made with several rows of sutures It was found however difficult to secure a closure which would not permit subsequent leakage The condition is very different from that which is met in sewing up an intestine because here there is no peritoneal covering to produce a plastic exudate and so secure repair The result was that many of these early operations were followed by leakage infection and death or if the patient recovered with either a temporary or a permanent fistula On that account a variety of methods of treating the sac have been advocated One in which the sac is drawn up out of the wound with or without being twisted and stitched into the upper angle of the wound is most to be commended This leaves a fistula which may be cured by a second operation but it protects the patient against infection due to leakage in the mediastinum and is to be preferred to the earlier methods of simple extirpation of the sac and suture The plan which we have developed in this clinic might properly be called the Sippy Bevan operation because it was at the suggestion of Dr Sippy that I first performed it and because of Dr Sippy's insistence that if possible the sac should not be opened but dealt with in some way which would prevent leakage into the surrounding tissues of the neck With that purpose in view in the first case that I operated on I isolated the sac as I have done in this case and obliterated it by a series of purse string sutures (Fig 187) I am using for this purpose linen which has been vaselined so that it will run more smoothly in the tissues and lessen the risk of tearing through the sac—a little point in the technic which I wish to emphasize You will see that I am carefully obliterating this sac by these purse string sutures and invaginating the sac into itself and the esophagus In this

case I have used four purse-string sutures, the first three being of linen and the last one of iodine gut. I am doing this because

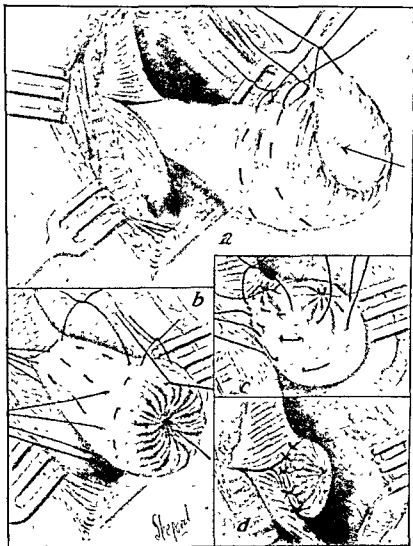


Fig 187—Sippy-Bevan operation for cure of diverticulum of the esophagus

the three linen sutures will be passed into the esophagus eventually, and the last purse-string suture of iodine gut will, of course,

be absorbed and produce a firmer cicatrix. Depending upon the size of the sac we may either handle it with these purse-string sutures alone, or in case the sac is so large that if it were all inverted into the esophagus it would produce an obstruction, we may obliterate about two-thirds of the sac with these purse-string sutures and then put in five or six longitudinal sutures, as you see represented in Fig. 187, *b*. The resulting picture is a complete obliteration of the sac, as shown in Fig. 187, *d*.

We have now obliterated the sac entirely. We have repaired the divided omohyoid muscle, and we close the deep fascia with fine catgut sutures and the external wound with black linen without any drainage.

The after-management of these cases is exceptionally important, and consists in giving the patient liquid by rectum for the first twenty-four hours and later by feeding him through a small rubber tube passed through the esophagus into the stomach, or into the esophagus well below the point of the diverticulum.

I desire to present to you, as the best method of handling these pulsion diverticula, both large and small, the technic which I have adopted in this case.

REMOVAL OF MURPHY BUTTON FROM STOMACH TWO AND ONE-HALF YEARS AFTER GASTRO-ENTEROSTOMY FOR DUODENAL ULCER

Summary A patient with transient recurrent attacks of vomiting associated with severe abdominal pain, importance of the x ray, especially of fluoroscopy, in locating the cause of the symptoms, rôle of the Murphy button in gastric surgery

THE second case which I want to present to you this morning is this patient on whom we recently operated. This is another case in which the x-ray was of great value in making the diagnosis

This man came to me a few weeks ago with the statement that two and one-half years before he had been operated upon by the late Dr John B Murphy for duodenal ulcer. He made a splendid recovery from the operation and was very greatly improved, gaining in weight and strength, and considered himself entirely cured until some weeks ago, when he had a sudden severe attack of pain in the abdomen associated with vomiting which lasted for some hours. He recovered rapidly from this attack, but since that time has had several other attacks.

On obtaining his history I could find nothing determinable as to the cause of the symptoms until the x-ray pictures disclosed a large oblong Murphy button low down in the abdominal cavity. It seemed to occupy a position in the pelvis. My first impression was that it was caught in some way in the sigmoid. I turned the patient over to our roentgenologist, Dr. Roundtree, and told him that I wanted him to determine the location of this button. Dr. Roundtree's demonstration was very conclusive. He first gave the patient a barium meal in front of the screen, and with the first splash of barium in the stomach the button disappeared, showing that the button was in a very low-lying stomach.

A small incision was made above the umbilicus, and with very little difficulty the stomach was explored, and the portion

containing the button was drawn outside of the abdominal incision. A clamp was placed on the stomach below the button and quite a small incision sufficed to enable us to push the narrow end of the button out of the stomach. The wound in the stomach was closed in the usual way by three rows of sutures (Fig. 188).

The exact way this button produced the symptoms is difficult to explain. I am rather inclined to believe that it was caught in the gastro-enterostomy opening, and so blocked up the opening in the jejunum as to produce obstruction with resultant pain from overdistention of the stomach, and vomiting; that then the button worked back into the stomach and the obstruction was relieved. Murphy was for some years my colleague in this clinic, and I do not think that any of us can overestimate the great service that he rendered to abdominal surgery by the introduction of the Murphy button. The Murphy button was used as the means of safe anastomosis with which the first extensive gastro-intestinal work was done. Such men as the Mayos and Mikulicz did their first large series of successful gastro-enterostomies with the Murphy button. It demonstrated to the surgical world the safety of these operations. It proved later to be one of those devices that belong to the developmental stage of surgery. I think it has served its purpose splendidly, but that it now has a limited field of usefulness and that our gastro-enterostomies are today done better by the use of a needle and thread than by the use of any mechanical device, even such an ingenious and efficient device as the Murphy button. It should, however, be retained in the armamentarium of the operating surgeon because occasions do arise where the rapid anastomosis permitted by the Murphy button proves life-saving. In this connection I want to say that the particular case which I show you this morning is illuminating because it probably explains why some of the cases, operated on in an attempt to find the Murphy button before the days when we had developed x-ray examination to the present stage of efficiency, failed. I remember one case in the hands of my colleague, Dr. Christian Fenger, in this clinic, very similar to

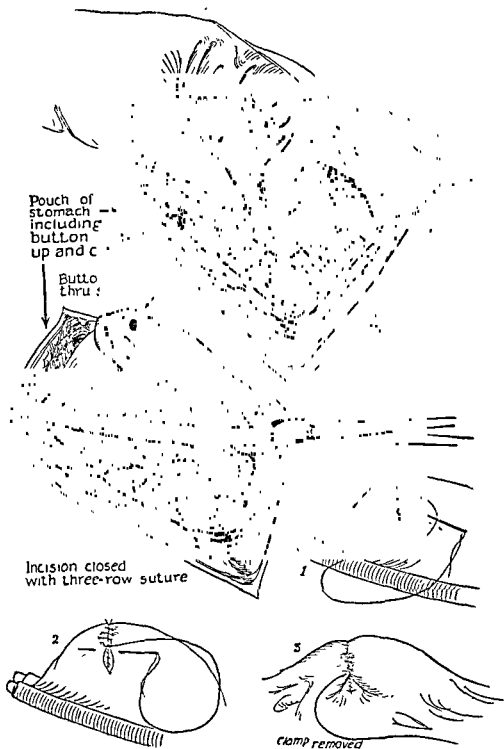


Fig. 188.—Removal of Murphy button from stomach and technic of closure of gastric incision by three-row suture.

the one which I present this morning, in which he found exactly the same picture. In the x-ray the button was low down in the pelvis. He interpreted the findings as showing that the button was in the intestinal tract, and made a most careful search of the entire intestinal tract without finding the button. I am inclined to think that it must have been loose in the stomach as in this case, and that a barium meal would have demonstrated that fact without any difficulty. In Fenger's operation he made a low incision, and I do not think he seriously considered the possibility that the button might have been in the stomach.

The patient whom I am now showing you made a good recovery from the operation, and his convalescence has so far been uninterrupted. He sat up on the third day, and there has been no recurrence of the symptoms.

HERNIA OF THE DIAPHRAGM

Summary: A case in which the entire transverse colon and great omentum lay within the thoracic cavity, pre-operative diagnosis made by x-ray Technic of curative operation, classification, etiology, and diagnosis of diaphragmatic hernias.

I HAVE the opportunity of showing you this morning one of the most interesting cases that has presented itself in this clinic for a number of years

The patient, Mrs L O., is a woman of forty-one, whose chief complaints are those of constipation and loss of weight and strength. She felt quite well until five years ago, when she commenced to have recurrent attacks of heart-burn coming two or three hours after meals, associated with belching of sour material, and made worse by coarse foods, vegetables, and fruits During the past few weeks the patient has had three or four attacks a week and has vomited. She has sometimes vomited quarts of material which, however, has never been bloody or coffee-ground; she has never felt any evidence of peristalsis in the abdomen. She has gradually lost ground in the last six months, and during this period has lost 30 pounds in weight. She has been constipated for years Has never, as far as she knows, had blood or mucus in the stools.

When she came to the hospital a fluoroscopic examination of the stomach and duodenum after a barium meal showed a small amount of retention The stomach was large and there were very vigorous peristaltic waves A small stream of barium could be seen passing through the duodenum, but there was no duodenal cap A possible diagnosis of duodenal ulcer was considered, and the patient put on ulcer management She improved somewhat under this, and left the hospital after a short time

She returned, however, in a short time complaining of still further loss of weight and of crampy attacks in the upper abdomen Since leaving the hospital the patient has been on care-

ful ulcer management and has aspirated her stomach daily. When she went on two-hour feeding she noticed a tendency to nausea and had to aspirate herself three or four times a day. She then went on hourly feeding. When she aspirated her stomach she obtained from 1 to 4 pints at a time. She has been confined to bed at times during the past two months.

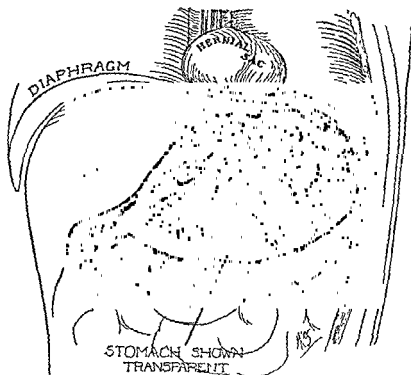


Fig 189 —Hernia of transverse colon and omentum through diaphragm by way of lesser peritoneal cavity.

She feels weaker and has lost an additional 10 pounds, but has none of the previous burning in the epigastrium.

Another fluoroscopic showed no retention, but very active peristaltic waves. Finally the colon was distended with a barium injection. This showed a most interesting condition, as is shown in the diagram (Fig. 189), of a diaphragmatic hernia of the colon, which Dr. Sippy believed occupied a position behind the stomach

in a large sac in the thoracic cavity. After this diaphragmatic hernia was discovered, we obtained from the patient a history of a fall down the entire length of a flight of stairs four years before. She fainted at that time and it is possible that this traumatism may have had something to do with the development of the hernia, although this is simply suggested as a possibility.

Operation.—I shall operate upon this patient under ether anesthesia. An S-shaped incision is made on the left side from the xiphoid to the level of the umbilicus and a very large free opening of the upper left abdomen obtained. On entering the peritoneal cavity a very singular picture is found. The stomach comes into view and under the stomach are coils of the small intestine. The great omentum and transverse colon are nowhere to be seen (Fig. 189). On introducing the hand behind the stomach the fingers enter a large opening in the diaphragm capable of admitting three fingers of the right hand. A large cavity can be felt above the diaphragm containing the entire omentum and transverse colon, part of the ascending colon, and part of the descending colon. These structures are drawn down into the abdominal cavity very carefully, although in doing this the great omentum is torn in one place and bleeds. This tear is repaired by suture.

After reducing the hernia the left hand is plated on the anterior surface of the stomach and the stomach drawn downward. The edges of the large incision are held apart with retractors, and a very large esophageal opening three or four times the normal size is brought into view. When the patient breathes the air rushes into the cavity above the diaphragm with much the same sound that is made when one puts a large drainage-tube into an empyema cavity, and the air rushes in and out of the pleural cavity during respiration. As is shown in the diagram (Fig. 190), this large opening is sewed together with good-sized catgut, just as we would sew the internal oblique and transversalis to Poupart's ligament in closing an inguinal hernia. The crura of the diaphragm are very large and muscular, so that we can take a good $\frac{1}{2}$ -inch bite with the needle, and such an excellent exposure is obtained with our large incision that we

can readily do this without injuring any of the vessels in the diaphragm. The opening is closed so as to leave simply enough room for the esophagus. The closure is so complete that I do

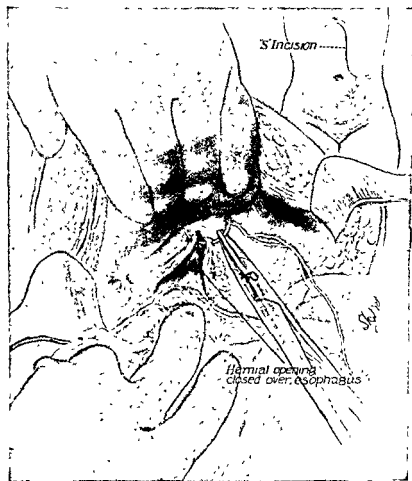


Fig 100—S-shaped incision and exposure gained thereby, closure of hernial opening by suture of the pillars of the diaphragm

not think that it is necessary to stitch the omentum or transverse colon to the abdominal wall in order to prevent a recurrence. We shall close this large incision without any drainage. The head nurse informs me that the pads and sponges are all ac-

counted for, and my stenographer will make a note of that fact in the operative notes. The patient is in excellent condition at the close of the operation.

I want to use this case as a text to say a few words in regard to diaphragmatic hernias. We have had three of them in the last few weeks, one you have just seen operated upon, and two others that were diaphragmatic hernias of a part of the stomach through an enlarged esophageal opening have been presented on previous occasions. (See *Surgical Clinics of Chicago*, February and April, 1917.) I take it that no one has had enough experience with hernias of the diaphragm to warrant him in speaking dogmatically about the condition. I think, however, that the time has arrived when we should demand a somewhat better classification of these conditions than we have had heretofore, and to that end I suggest the following arrangement:

(1) True hernia of the diaphragm, such as the case which I have just operated upon. I would limit this class to the hernias that occur at the normally weak point in the diaphragmatic wall, namely, the esophageal opening. True diaphragmatic hernia, I think, occurs at this weak point, just as does an inguinal hernia at the weakened point in the abdominal wall through which the spermatic cord passes.

(2) In the second division I would place congenital diaphragmatic hernia in which there is a congenital defect in the diaphragm, and at birth a part of the abdominal contents are found in the thoracic cavity. Most of these cases are not consistent with life, although a few patients with such congenital defects in the diaphragm have been known to live to adult life or even to advanced age. Strictly speaking I think that these cases should be classified as congenital defects of the diaphragm, or possibly as congenital diaphragmatic hernias, and not as true diaphragmatic hernias.

(3) Traumatisms of the diaphragm with such an injury as to permit the passage of part of the abdominal contents into the thoracic cavity. These, I think, should be properly classified as traumatisms of the diaphragm and are the results of stab wounds, bullet wounds, and of ruptures of the diaphragm from severe

contusions of the abdomen. Most patients, after these serious ruptures of the diaphragm leading to traumatic hernia, die as a result of the injury. Some of them, however, recover with resultant traumatic hernias, which may be operated upon shortly after the injury or later, or the condition may be such as to be compatible with life without any repair.

I think it important to make a sharp division between traumatism of the diaphragm, with resultant hernia, and the true or the congenital hernias of the diaphragm. This is especially important because the line of attack, if surgical procedures are called for, differs so much in the two cases. In ruptures of the diaphragm the tears in most cases involve part of the periphery of the structure, permitting or sometimes demanding a trans-thoracic operation for their repair. In most congenital defects of the diaphragm with hernia and in true diaphragmatic hernia at the esophageal opening my experience teaches that the abdominal route is the one of choice.

It is hardly necessary for me to tell you how much the x-ray has done for us in increasing our ability to diagnose these obscure conditions. It has, in fact, given us an absolute means of diagnosis in many cases which would otherwise be very difficult.

I want to emphasize another point which has been gradually forced upon me from my increasing knowledge of these cases, and that is the desirability of attempting to analyze the etiologic factors in the production of each individual case. I am inclined to believe that in the ordinary true diaphragmatic hernia the same factors are responsible for the production of the condition that are responsible for the ordinary abdominal hernias, such as the inguinal and femoral. Let us see what these factors are. The presence of a weakened point in the abdominal wall and frequently of a preformed peritoneal sac passing through this opening, together with conditions that produce increased intra-abdominal pressure, such as straining, coughing and the incidence of pregnancy, seem to be the most important. In one of our cases which I have recently demonstrated the cause of the hernia was clearly a gradually increasing tension within the abdomen produced by a small circular carcinoma at the splenic flexure.

(See Surgical Clinics of Chicago, April, 1917.) This had led to such increased intra-abdominal tension as to produce a true hernia of the diaphragm and had forced part of the stomach into the thoracic cavity. The symptoms that are produced by this condition are not, as a rule, very clearly cut, nor do they point strongly to the existence of such a lesion. They are, as a rule, suggestive rather of some obstructive process in the stomach or intestines, and the condition becomes clear only after its discovery by x-ray examination.

Postscript.—The patient made an unusually satisfactory recovery, and left the hospital entirely cured of her diaphragmatic hernia and of the symptoms of which she had previously complained.

CARCINOMA OF THE JEJUNUM; 5 CASES OF CHRONIC INTESTINAL OBSTRUCTION DUE TO LESIONS LO- CATED NEAR THE DUODENOJEJUNAL JUNCTION

Summary Diagnosis of obstruction near the duodenojejunal junction, differentiation from obstruction at the pylorus—importance of the x ray, causes of obstruction in this region, treatment Management following gastro-enterostomy in a case with complete obstruction of the duodenum

THE last case which I shall show you this morning is a particularly interesting one that has been referred from the Sippy service to my surgical department The clinical picture, briefly, is as follows

A man of about sixty, who had been in very good health previously, has had during the last six months three severe acute abdominal attacks, associated with pain in the epigastrium and the vomiting of a large amount of fluid, sometimes a gallon or more, and with a general picture suggestive of an obstruction of the pylorus These attacks, however, have been of short duration, and between the attacks the patient has been in fairly good health, although his weight and strength have been gradually decreasing Dr Sippy has had him under observation for some time, and after an exhaustive study has made a clinical diagnosis of an obstruction at some point high up in the small intestine At first the findings seemed to point to an obstruction at the pylorus, but examination by means of barium meals, x-ray, and screen showed a normal stomach, no obstruction at the pylorus, a normal filling, and a normal duodenal cap In several of a series of most careful screen examinations of the patient it was thought that a small lake of the barium would remain for a few minutes in the upper part of the small intestine shortly after it had passed through the duodenum This was observed several times This, with the fact that such large amounts of material were vomited when the patient had his attacks, suggested a probable diagnosis of an obstruction high up in the small intestine, pos-

sibly at the junction of the duodenum and jejunum or in the first part of the jejunum. On the basis of the above findings and the absence of a history of previous abdominal inflammatory lesions the pathologic process is regarded as probably carcinoma. With that clinical diagnosis, therefore, we shall make an exploratory operation, as you see, under ether anesthesia.

TECHNIC OF OPERATION

A midline incision is made extending from the ensiform to the umbilicus. On opening the peritoneum nothing abnormal is found at first. The stomach is normal and the pylorus and duodenum are normal. Examination of the colon is negative. On lifting up the great omentum and transverse colon and hunting for the first part of the jejunum, you see that I pull into view a very greatly distended loop of the jejunum, extending from the junction of the duodenum and jejunum to a point where I find, as I draw this loop of bowel into view, a zone of obstruction and a lesion (Fig. 191, *a*). This is evidently a carcinoma. It is about as large as a silver half-dollar and is located on the jejunum, about 12 inches from the duodenojejunal junction. You see that below this point the intestines are of normal size. On examining the mesenteric glands I find no glandular involvement, and on examining the liver no secondary masses of carcinoma in that organ. I shall, therefore, resect this definite gross lesion and make a lateral anastomosis.

I place two clamps on the small intestine about 3 inches on either side of the carcinoma, and remove this portion of the bowel with the tissues of the mesentery. The vessels in the mesentery are ligated. The ends of the small intestine are invaginated and closed with two purse-string sutures. Then, as you see, I make a lateral anastomosis as one would make a gastro-enterostomy (Fig. 191, *b*). I am using here the old Billroth method of three rows of sutures—one for the mucosa, one for the muscularis and peritoneum, and finally a Lembert. The pads and sponges are accounted for and the external wound is closed without drainage. The patient is in excellent condition at the close of the operation.

On examining the specimen there is shown on the peritoneal surface the characteristic picture of a carcinoma (Fig 192, *a*) On opening the bowel the carcinoma is found to be larger on the inner surface than on the outer (Fig. 192, *b*).

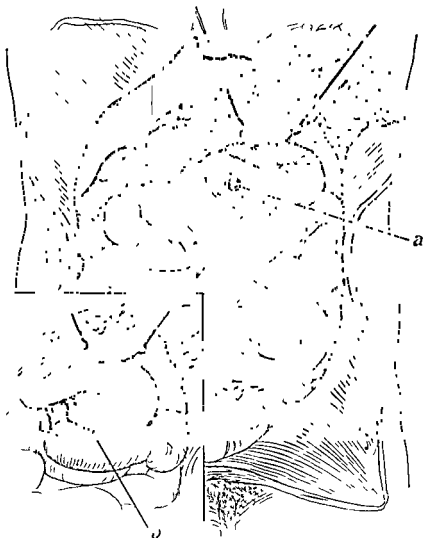


FIG. 191—*a*, Location of carcinoma, note distended jejunal loop proximal to the lesion, *b*, resection of tumor and lateral anastomosis completed

Postscript.—The patient made an uneventful recovery from the operation. His pre-operative symptoms disappeared entirely, and from the absence of any glandular or visceral involvement

and from the limited extent of the lesion we believe that he has an excellent prospect of a permanent cure.

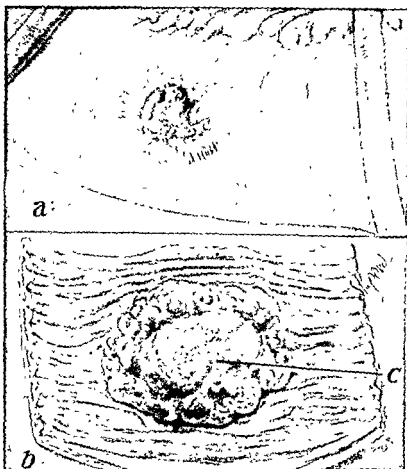


Fig 192—*a*, Carcinoma of jejunum from peritoneal side. Clamps are in position preparatory to resection, *b*, same lesion after resection, bowel has been opened, exposing the typical picture of an ulcerating carcinoma. (Both drawings have been made to the same scale.)

I wish to use this case as a text for the discussion of 5 cases of obstruction high up in the small intestine which we have had under our care during the past year. I think it is rather unusual to have the opportunity of observing a group of 5 of these cases

within a short period. They are rare. They have interested us sufficiently to make us devote a good deal of careful study to this particular type of case.

The first case was a woman with an abdominal tumor which was of uncertain variety, until we had the opportunity of making a microscopic examination, when it proved to be a malignant epithelioma of the ovary. The patient came to the hospital with continuous vomiting, which at first was thought to be the vomiting of pregnancy, and the pelvic tumor was thought to be consistent with pregnancy. It was impossible, however, to control the vomiting, and later it was found that she was not pregnant, and the tumor was removed. When this was done we felt it would cure her condition, but the vomiting persisted after the removal of the tumor.

A careful study of the case seemed to show that she had an obstruction at the pylorus or high up in the small intestine. At the time that the tumor was removed the stomach and pylorus had been examined and no obstruction found. It was therefore thought because of her symptoms that she must have an obstruction high up in the small intestine. Another operation was done, and in drawing the omentum and transverse colon out of the wound an obstruction was found in the jejunum very close to the junction of the duodenum and jejunum, an almost complete and very narrow obstruction, not much larger in size than a bass viol string. A lateral anastomosis was made and the patient went on to a most satisfactory recovery, with an increase in weight of 30 or 40 pounds, and seemed to be perfectly well.

A year and a half or two years later, however, she commenced to have obstructive symptoms. Another exploratory was made and a wide spread peritoneal involvement from the malignant epithelioma of the ovary was found, and the case within a short time went on to a fatal termination.

Another case which we still have under observation was one in which a diagnosis of pyloric obstruction was first considered, but after careful analysis, it appeared that the obstruction was not at the pylorus, but high up in the small intestine. This clinical diagnosis was made before the exploratory. At the

and from the limited extent of the lesion we believe that he has an excellent prospect of a permanent cure.

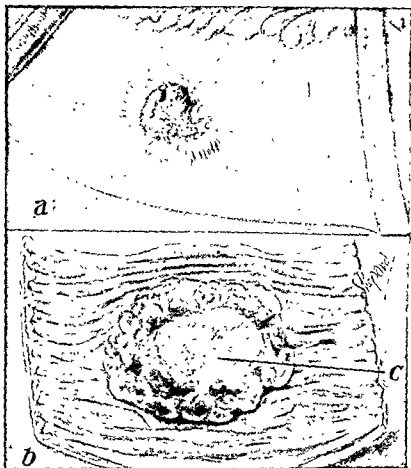


Fig. 192—*a*. Carcinoma of jejunum from peritoneal side. Clamps are in position preparatory to resection, *b*, same lesion after resection, bowel has been opened, exposing the typical picture of an ulcerating carcinoma (Both drawings have been made to the same scale)

I wish to use this case as a text for the discussion of 5 cases of obstruction high up in the small intestine which we have had under our care during the past year. I think it is rather unusual to have the opportunity of observing a group of 5 of these cases

evidence is of considerable value in showing a normal stomach and duodenum as far as the x-ray examination is concerned, and sometimes, as in the case which we have just operated upon, may be of value in showing a very short retention of a part of the barium meal high up in the small intestine, or there may be prolonged retention. I would emphasize, too, in discussing this group of cases the importance of studying them jointly with the internist and the roentgenologist, because it is in this way that we have been able to unravel several of these difficult problems.

**VAGINAL HYSTERECTOMY FOR CARCINOMA OF THE
CERVIX UTERI. RADIO-THERAPY IN THE AFTER-
TREATMENT AS APPLIED BY DR. HENRY SCHMITZ**

Summary A patient with the characteristic signs and symptoms of moderately advanced carcinoma of the cervix vaginal hysterectomy superior results obtained by the use of the cautery instead of the knife threefold value of the cautery—(a) a cutting agent (b) a hemostatic agent (c) a destroyer of tumor cells technic of the application and the results of radium and x ray treatment in the after-care of cases of the above type

History—The patient a married woman of thirty four years was admitted to the hospital March 27, 1917

Her family history is negative as to carcinoma One brother died of tuberculosis She has had the usual diseases of childhood, typhoid fever seven years ago Her habits are good Menstruation began at sixteen years regular, three days' duration and a moderate amount She has been married fifteen years and has three children

In July 1916 she had an abnormal uterine hemorrhage In November she had a second and two weeks ago she had a third which was more severe than the two previous ones For the past month there has been a slight vaginal discharge with a bad odor She has no other symptoms

Examination—The patient is an obese female with a good color Eyes and nose are negative Tongue is thickly coated and tonsils are small The thyroid gland is easily palpable The lungs are negative The left border of the heart is apparently 1 cm. to the left of its normal location There are no murmurs The aortic second sound is sharp and snappy The abdominal walls are thick, and at present there are no points of tenderness Knee-jerks are lively The cervix is enlarged

to the diameter of 8 cm. It is nodular, hard, and irregular. The os is small. The body is also enlarged, somewhat movable; manipulation of it causes pelvic distress. Nothing can be felt in the fornices.

Operation.—DR. OCHSNER (March 28, 1917): You see this cauliflower-like mass protruding from the cervix. The mass represents a carcinoma and seems to have originated on the inside of the cervix. It is continuous with the mucous membrane

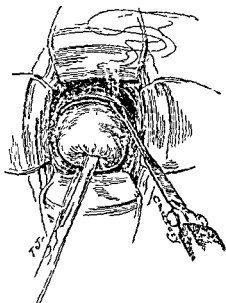


Fig. 193—Vaginal hysterectomy with the electric cautery. Broad vaginal retractors applied. The vaginal wall severed with the cautery.

of the cervix. It bleeds quite severely upon the slightest touch. With this electric cautery we cut away the margin of the vaginal mucous membrane 2 cm wide of the growth (Fig. 193).

Thirty years ago Dr. O'Byrne, of Brooklyn, pointed out the advantage of removing these carcinomas with the cautery. We followed his advice at that time, and had some very remarkable results in cases that seemed hopelessly far advanced. Later on the plan of removing the carcinoma with the knife became popular. Then we too removed them with the knife,

but soon found that our results were very much less permanent than they had been when we did our operations with the cautery, so we returned to the use of the cautery about twenty years ago, and we have been very well pleased with the results.

One feature that I dislike about this case is the fact that there seems to be a bacterial infection in addition to the carcinomatous infection, because we find a discharge of pus from the

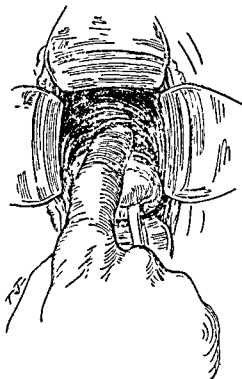


Fig. 194 — Showing the dissection of the uterus from the vaginal wall by means of the index-finger.

substance of the tumor. You see I am severing the vaginal attachments very carefully. Wherever I cut a vessel with the cautery I grasp it immediately with hemostatic forceps and leave these hemostatic forceps in place. We cut all our tissues with the cautery, so that at no point have we a raw surface that has not been seared. I cauterize with the actual cautery to control hemorrhage and also use the cautery as I would a knife to excise the growth.

Now that the vaginal wall has been severed, I shall dissect it off of the uterus with the index-finger of the right hand (Fig. 194). This frees the uterus from the vagina so that the uterus can be brought forward by means of a claw-like retractor placed in the fundus. The broad ligament containing the uterine artery is next caught with forceps (Fig. 195) and severed with the cautery. Now I clamp the upper

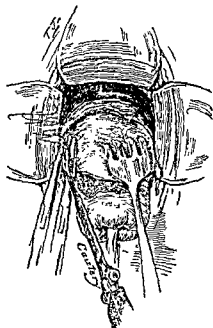


Fig. 195—The fundus brought forward with a sharp retractor and the uterine artery being clamped and sectioned

portion of the broad ligament and sever it in the same manner (Fig. 196).

You see I have proceeded methodically step by step, taking care that there should be no point at which the uterus was severed from its attachments except by means of the cautery.

Now we have removed the entire uterus (Fig. 197). The blood-vessels appearing in the field have been kept under such

complete control by our clamps and cautery that at no time has there been any considerable loss of blood. Our next step will consist in touching all the various pedicles, that are still in the grasp of the forceps, with the cautery, so that they will all be thoroughly seared over, and so that the heat will go from the actual cautery into the forceps and will destroy any malignant tissues which might possibly have been grasped by them.

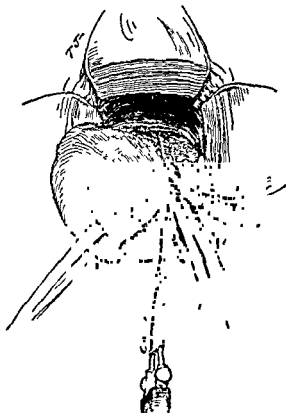


Fig 196.—The remainder of the broad ligament clamped and sectioned, thus freeing the uterus

In my own experience the only cases that have recovered permanently are the cases in which we inserted soldering-irons heated to a white heat directly into the cavity of the uterus, in that way destroying all the tissues and leaving a shell of the uterus in place. For a time we were under the impression that it would be possible for us to dissect out the lymph-nodes

along the iliac artery and vein, and in that way prevent a recurrence of the carcinoma in the cases that had advanced too far to be relieved by the operation that I am doing now, but so far our results have not justified the additional risk to which this maneuver has exposed the patients. The immediate mortality was much higher than among similar patients not so treated, and the ultimate mortality was fully as high, so



Fig. 197 —The uterus removed

that at the present time we do three operations: First, the operation I have just performed, consisting of the removal of the uterus by clamping all its attachments, cutting them with the cautery, and cauterizing the stumps. The second operation consists of cutting off the vaginal attachments of the uterus by means of the cautery, and then doing an abdominal hysterectomy, removing at the same time both ovaries and

tubes. The third method, which we use only in the hopeless cases, consists in first curetting out the carcinoma very rapidly, and then cauterizing all the tissues by inserting the cautery irons into the cavity of the uterus and simply cooking the uterus until it is completely destroyed.

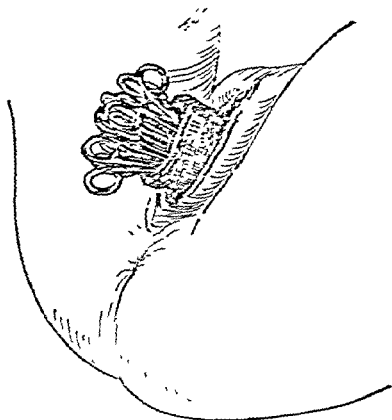


Fig. 193.—Showing the forceps and gauze pack left in place. A retention catheter from the bladder should also be shown.

In the case before us I leave all these forceps in place so that there can be no chance of bleeding. Around the forceps I pack a strip of iodoform gauze so as to prevent pressure-necrosis of surrounding tissues (Fig. 193). The forceps will be loosened after thirty-six hours, left in place for twelve hours more, and then withdrawn. We will give the patient intensive x-ray

treatment over the pelvis and also radium treatment in the wound crater. Dr. Henry Schmitz will tell you how he will apply the radium in this case.

DR HENRY SCHMITZ: Recurrences of uterine tumors after surgical eradication of the diseased organ occur in three ways: (1) In the tissues surrounding the organ, as the vagina, the bladder, the rectum, and the parametria; (2) in the regional lymph-gland groups, especially the hypogastric, iliac, and sacral in cervix carcinoma and the inguinal and lumbar in corpus cancer; (3) in distant organs. The object of radium and roentgen-ray therapy is to prevent recurrences in the pelvic tissues and organs, the regional lymph-glands, and also in the secondarily invaded distant organs, if they are amenable to the treatment.

We may state that the indications for the employment of each of these irradiations are definitely fixed. Radium rays act best if brought in close or immediate contact with the organs or tissues to be treated. Therefore, skin cancers and growths that can be reached through natural or artificial canals may be treated with radium rays. The roentgen rays may be applied to almost any part of the body and to large areas which could not be reached or could not be so effectively influenced with radium rays.

Hence, radium is inserted in the crater of the broad ligament to destroy, if possible, all carcinoma tissue and cell-nests that were not removed by the knife and the cautery, while the roentgen rays are applied through the abdominal wall anteriorly, and the sacral region posteriorly, to destroy the carcinoma deposits in the lymphatic vessels and glands and their contiguous tissues.

When radium is used after a hysterectomy as a prophylactic we insert a capsule containing 100 mg. radium element for about ten hours. The alpha- and beta-rays are arrested by a brass screen of 12 mm. thickness. The secondary, or Sagnac rays, which form in the metal filter, are absorbed by a pure para-rubber tubing of about 3 mm. thickness. The application is made as soon as the patient has recovered from

the effects of the operation and the packing has been removed, *i. e.*, three to five days after the operation, and is repeated ten days later. The total amount of milligram hours, therefore, is about 2000.

The technic of the roentgen-ray treatment is as follows: The suprapubic region is divided into eight to twelve squares and the sacral region into four to six squares of $1\frac{1}{2}$ inches each. A Coolidge tube of a hardness of ten Heinz Bauer is loaded with 8 milliamperes of current. The focal distance, that is, the distance from the anode to the skin surface, should be 21 cm. The tube is tilted so the rays are directed into the pelvis. The rays are filtered through a sheet of aluminum 4 mm. thick. The secondary rays are rendered inert by distance filtering, the aluminum screen being inserted at about half-way between the anode and the skin surface. An erythema dose, *i. e.*, 1 E., will thus be reached within three to four minutes' exposure. About 2.5 E. are given to each square. If twelve fields or portals of entrance are employed a total amount of about 30 E. or 300 X is given. The entire amount is applied within one to three days. Such a course of roentgen-ray treatment is repeated after three weeks. During the time of the treatment and for an additional week 2 grams of sodium bicarbonate are given to the patient internally daily.

The patient is requested to return for examination every six weeks. A careful inspection and bimanual vaginal and rectal palpation are made. If a recurrence is detected, another course of radium and roentgen-ray treatment is immediately ordered.

Some patients do not exhibit any accessory symptoms or side actions, while others will show various degrees of one or more or all the following symptoms: nausea, vomiting, anorexia, rectal irritation, diarrhea, vesical tenesmus, frequent urination, and lassitude. These symptoms are the result of toxemia, the toxin being produced by the cell death caused by the actions of the rays. They are usually transitory, but may become very persistent, baffling all attempts at relief. Should the latter take place, the patient may, indeed, lose in

strength and weight and become desperately ill. This is, fortunately, the exception.

We cannot render an opinion of the value of prophylactic actinotherapy. Some patients succumb to recurrence in spite of its use, while others have survived periods of years free from any recurrence. If we consider the experience of other clinics, we must conclude that all operations for carcinoma should be followed by the combined radium and roentgen-ray treatment. Statistics of Kelly and Burnam, Kroenig and Gauss, and our own seem to coincide with this opinion.

CLINIC OF DR ALBERT E HALSTEAD

St LUKE'S HOSPITAL

INTERNAL HYDROCEPHALUS: PUNCTURE OF THE CORPUS CALLOSUM

Summary A child, twelve years old, with hydrocephalus of three years' duration, the history and physical examination, pathology of internal hydrocephalus, treatment—technic of puncture of the corpus callosum

G S, FEMALE, aged twelve This child up to three years ago was in the best of health About five years ago the parents thought her vision was affected Examination of the eyes at that time by a competent oculist showed no abnormality Vision was normal after correction for a slight astigmatism Three years ago the parents discovered that she could not see with the left eye About this time they detected a slight enlargement of the head The child at that time complained of dizziness and progressive loss of vision Eleven months ago she became ill with a febrile attack The third day of the attack she had two general convulsions, preceded by severe headache, vomiting, and dizziness The convulsions lasted for several minutes and were followed by a mild delirium that lasted for about three hours Following the delirium she became drowsy, and passed into a deep sleep that lasted for eight hours Since having the convulsions her general health has greatly deteriorated and her appetite is poor She complains of pain in the head, particularly in the mornings, and of a severe ringing in the ears and dizziness, which pass away as the day advances She is now completely blind in the left eye She can distinguish persons and objects with the right eye and read large print Her mental condition is good She has the appearance of being unusually bright and cheerful. She had measles during her fifth year, no other diseases of child-

hood. The family history is negative. The Wassermann is negative.

Physical Examination.—The patient is a little girl about twelve years of age, fairly well developed, but small for her age. She appears mentally normal. Head, neck, and scalp are negative for scars and defects. The head is covered with an abundance of hair. The pupils react to accommodation. She can see nothing with the left eye. With the right eye she can distinguish objects and read newspaper headlines. She has control of all the muscles of the eyeball in divergence and convergence. No nystagmus. The ears are perfectly normal. She can distinguish the tick of a watch at a distance of about 4 feet. There is no difference in the two ears. There is no facial paralysis. The two sides appear equally strong. Taste is normal on both sides of the tongue. She can distinguish bitter and sweet equally well on all parts of the tongue. There are no hyperesthetic or anesthetic areas. Reflexes present and normal. The chest is fairly well developed. The heart and lungs are negative to auscultation and percussion. The heart sounds are clear. There are no râles. The abdomen is negative. The liver and spleen are not palpable. There are no tender areas or masses. The extremities are negative. Apparently there are no lesions of the cranial nerves except the optic nerve.

COMMENTS

Free communication between the ventricular contents and the subdural space is necessary if the nutrition of the brain through its normal blood-supply is to remain undisturbed. Any interference to the free interchange of fluid between the ventricles and the subdural space is followed by an increase in the intraventricular pressure, which, in turn, compromises the blood-supply to the brain, bringing on various disturbances of function. When, from whatever cause, the obstruction to the escape of ventricular fluid into the subdural space occurs, distention of the ventricles results. This we recognize as internal hydrocephalus. Disturbance in the free circulation of the ventricular fluid may be due to a primary closure of the normal channels leading

from the ventricles, or it may primarily result from some obstruction of the veins of the ventricular walls, arising as a sequence of the ventricular distention. The closure of the normal ventricular canal may be brought about by a variety of lesions. Generally speaking, it is the result of an inflammatory process or it may be due to the pressure of a tumor. In a like manner the pressure from a new growth may obstruct the veins conveying the supply from the ventricular areas causing an increase in the fluid content of the ventricles and resulting in distention of the ventricles, which, in turn, by pressure causes closure of the ventricular outlet.

In order to re establish a free communication between the ventricles and the subdural space a permanent opening must be established with the least possible damage to the interposing portion of the cerebrum. To meet this requirement Anton was the first to propose a puncture of the corpus callosum (Balkenstech). This procedure, though not devoid of danger, possesses a minimum operation risk and offers a fair outlook for permanent relief when the obstruction is not due to new growth. In the latter case it probably does as much in the way of temporary relief from the increased intracranial pressure as the various decompression operations that are in vogue. It has been employed by the European surgeons in epilepsy, hydrocephalus, brain tumors including tumors of the hypophysis, in meningitis luetica and in tower skull. Anton reports 53 cases operated upon for these various conditions. The results were best in internal hydrocephalus of early life. Of these, he reports 17 cases with optic atrophy and without choked disk. In 2 with choked disk improvement in vision was obtained. In choked disk in brain tumor rapid improvement in vision was the rule.

In the patient we show you the eye-grounds show an optic atrophy in both eyes. There is no choked disk. In the left the vision is completely destroyed, in the right eye vision is 6/200. We propose to establish an opening through the corpus callosum and permit a free communication between the lateral ventricles and the subdural space, so as to diminish the intraventricular pressure. This will relieve headaches, and may pos

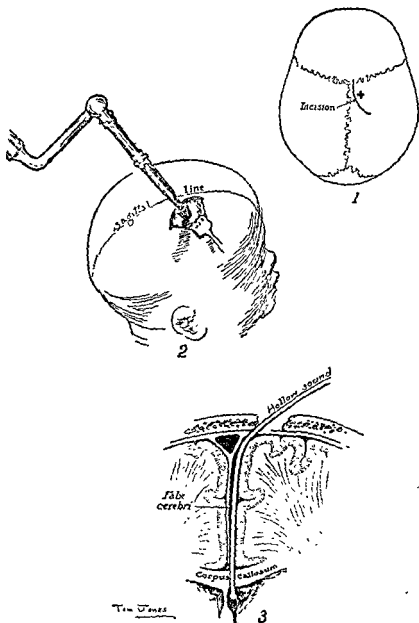


Fig 199—Technic of puncture of the corpus callosum. 1 Scalp incision: + indicates the point for trephining and is 1.5 cm. distant from each, the parietal and the coronal sutures. 2 Incision completed. Trephine opening being made. 3 Diagrammatic section showing the direction taken by the hollow sound and the depth to which it is introduced.

sibly prevent convulsive attacks and save what vision remains. The question as to what improvement, if any, will take place in the atrophied nerve is problematic. There is not much hope offered to the patient of any improvement in vision.

TECHNIC

The incision is made through the soft tissues to the bone, about 3 cm. long and parallel with the interparietal suture and $1\frac{1}{2}$ cm. to the right of the median line (Fig. 199). With a Hudson drill an opening is made in the skull $1\frac{1}{2}$ cm. behind the coronal suture and $1\frac{1}{4}$ cm. from the median line. This opening may be enlarged backward with a Macewen forceps. An incision is made in the dura 1 cm. in length. A flexible hollow needle with a stilet and having a blunt end is introduced under the dura toward the median line until the falx cerebri is reached. It is then turned downward, passing along the falx until it comes in contact with the corpus callosum, forming the roof of the lateral ventricle. This is reached at a distance of 4 or 5 cm. The corpus callosum is then punctured, the needle passing into the lateral ventricle. The stilet is withdrawn, and from 4 to 10 c.c. of cerebrospinal fluid is permitted to escape. If the needle has sufficient resistance the opening in the corpus callosum is enlarged so as to make it permanent by moving the needle laterally. In this way the substance of the corpus callosum is torn. By this operation the intraventricular pressure is reduced and a larger surface, that of the subdural space, is offered for absorption of the excess cerebrospinal fluid.

5

PYLORIC OBSTRUCTION FOLLOWING SULPHURIC ACID POISONING

Summary Signs and symptoms of sulphuric acid poisoning as shown by the present case symptoms of pyloric stenosis developing during the third week the roentgen ray diagnosis operative findings anterior retrocolic gastro enterostomy

E. W. age seventeen entered the hospital about five weeks ago immediately following the ingestion of sulphuric acid taken with suicidal intent. The quantity swallowed is not known. On admission he showed evidences of sulphuric acid burns on the lips and chin. He was conscious and in great pain restless and had frequent attacks of emesis. The fluid vomited was bloody and of a dark brown color with a strongly acid reaction and a sour odor. The pulse on admission was 100 and his temperature subnormal. In a few hours the pulse became weak and thready. Prostration was pronounced.

The usual antidotes were administered with stimulants and his condition gradually improved. The vomiting became less frequent. The bloody vomitus gave place to a mucopurulent fluid. At the end of four days the patient began taking liquid nourishment. He was able to return to his home on the ninth day.

About ten days after he left the hospital he had an attack of emesis in which he vomited a large quantity of bright red blood. This was repeated the following day. Two days later he vomited again. This time the vomitus was made up of pure pus the quantity amounting to about 4 ounces. Since then the vomiting—that is emesis with blood—has been a daily occurrence. Food taken into the stomach is vomited within a short time. The vomitus contains all the food taken mixed with blood and pus and has a sour fetid odor.

It has been apparent for the last three weeks that nothing has passed through the stomach. He has been sustained with nutrient enemata made up of 5 per cent solution of glucose.

Repeated examinations with the x-ray, both fluoroscopic and by radiogram, after barium meals confirm the opinion that there is a complete obstruction to the outlet of the stomach. The radiogram I show you would lead us to expect that the obstruction to the stomach occurs about the middle of the organ and that no barium passes beyond the constricting ring. The picture would



Fig. 200—Roentgenogram showing remnant of functioning stomach. Complete obstruction distally

suggest an hour-glass stomach, with two cavities completely separated by a constricting ring. The entire remaining functioning part of the stomach is represented by a small cup-shaped cavity immediately below the cardia. This cavity will hold about 4 ounces of the barium mixture (Fig. 200).

The indication present in this case is plain, that is, to furnish

an outlet to the remaining portion of the stomach. This can probably be done by a gastro-enterostomy, provided that the portion of the stomach wall forming the cup-shaped cavity has not been eroded by the acid to a degree preventing us from making a satisfactory anastomosis.

OPERATION

The usual median incision is made from the ensiform to the umbilicus. On opening the abdomen, before disturbing the relations of the organs, we see what appears to be a greatly constricted

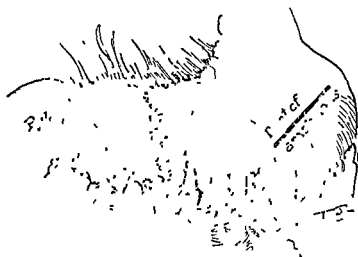


Fig 201 —Appearance of stomach at operation. Note the deformity of the distal half

and deformed stomach (Fig 201). There is a deep constriction extending from the lesser to the greater curvature, involving both the posterior and the anterior walls. The constriction is high up on the stomach, the part below representing about two-thirds of the entire organ. The latter, or pyloric portion, instead of being a closed cavity is a mass of firm tissue without any cavity being in evidence. What has happened is that the mucous membrane of this portion of the stomach has been destroyed and the cavity obliterated to a point just above the pyloric ring. Upon raising the transverse colon and endeavoring to reach the posterior wall through an opening in the transverse mesocolon,

we find that the lesser peritoneal cavity has been obliterated by the inflammatory process, the result of the corrosive action of the acid. There presents no surface posteriorly upon which the intestine may be fastened. We are, therefore, forced to bring the jejunum forward and attach it to the anterior wall of the stomach or to that portion remaining, which is, in reality, the fundus of the organ. In order that the most direct attachment of the jejunum to the fundus may be made, we tear through the transverse mesocolon close to its attachment to the transverse colon, and pass a loop of the jejunum through this opening, and then we make an anastomosis between the anterior wall of the stomach and the jejunal loop. This operation is the usual *anterior retro-colic gastro-enterostomy*. We use the Moynihan clamps and follow his technic and suture, using fine Pagenstecher's linen for the serous suture and fine chromocized catgut for the through-and-through suture, employing in the latter the well-known Connell method. Before completing the operation we suture the margin of the cut edge of the mesocolon to the stomach with a few interrupted sutures. The abdominal wound is closed, first, by continuous iodized catgut suture; second, by an interrupted fascia and muscle suture of chromicized catgut; third, by an interrupted skin suture of silkworm-gut.

CLINIC OF DR L L McARTHUR

MICHAEL REESE HOSPITAL

THROMBO-ANGIITIS OBLITERANS OF BUERGER. MODIFIED KOGA TREATMENT

Summary Theory and results of treatment by means of the intraduodenal injection of Locke's solution clinical course of thrombo-angitis obliterans failure of medication other methods of treatment where and when to amputate—the Moskowicz test trial of the modified Koga treatment should precede amputation

WE see here, in a Jewish Hospital a form of gangrene of the foot due to a condition that is not seen in our other hospitals to any such extent I refer to the thrombo angitis obliterans of Buerger which results in closure of the blood vessels, generally of the lower extremity although it may occur in the upper extremity which, in turn results in gangrene of the toes and foot and finally of the whole limb On learning of your coming I thought, as I had 2 such cases in the house, that I might show you what we are now doing for them I presented to the Chicago Surgical Society about a year ago 6 cases of this type of gangrene some of them cured, some of them in the process of cure and some of them improving

CASE I—The first case I will show you is that of a man who presents a typical example of incipient thrombo-angitis obliterans of Buerger His foot, after ten days' treatment (and you will have to take my word for this) has changed from a dark cyanotic and cold foot into a foot which is now perfectly warm, as warm as anybody's foot Today you will see a little granulating area the site of the gangrene which had started in the great toe before admission to the hospital This patient is now able to be up and around You see that he walks with a little limp, before he began treatment he was confined to bed with pain, that type of pain which morphin fails to relieve

You recall that Koga, of the University of Tokio, made some investigations in regard to the treatment of this type of gangrene. In these investigations he showed that by diluting the blood he could reduce its viscosity. Now the rate of flow through the artery is dependent upon the viscosity of the blood. If you have a blood-vessel whose lumen is narrowed down to a point, the flow through it is practically nil. If we dilute the blood by one-half we double the rate of flow. To obtain this result Koga recommended hypodermic injections of normal salt solution; a hypodermoclysis with 1 liter of salt solution at each sitting. This was done in a number of cases, and resulted in slow and gradual improvement when there was just dry gangrene of the toes with a definite line of demarcation, but no suppuration and no discharge. After the treatment had been in use for weeks there would start up a mild suppuration with a pouring out of leukocytes. Finally, all that would be necessary would be to amputate the dead portion, following which the living portion would begin to cicatrize. Such a case I showed last year, and I happen to have these two now to show you, and I wish to point out the modifications which we have made in the method of introducing the fluid and in the composition of the fluid.

After using the hypodermoclysis method for a time I sought another method of administration, as repeated subcutaneous injections of such large quantities of solution are attended with a great deal of discomfort. I tried intravenous injections at the elbow. After repeated intravenous injections one of two things happened, either the vein became obliterated or the tissues became so sore locally that the patients were inclined to discontinue the treatment. Then my colleague, Dr. Davenport, suggested that we introduce the fluid into the duodenum through a Rehfuß tube. With a Rehfuß tube you can introduce into the duodenum an incredible amount of fluid without causing any discomfort to the patient. Instead of giving 1000 c c two or three times a week, we can give a gallon or a gallon and a half per diem, which, of course, dilutes the blood absolutely. It flushes out the kidneys and later makes watery

bowel movements, but you can dilute the blood so thoroughly by this method that its viscosity is markedly reduced and the patient gets better. I have said that Koga used normal salt solution. We have felt that our results have been improved by the use of a physiologic solution, such as Locke's, a solution in which the calcium and potassium salts are present as well as the sodium, and so we now use it in our routine treatment.

CASE II.—In 1914 the toes on this man's right foot became gangrenous and were, therefore, removed. Later a portion of the stump became gangrenous, and in an attempt to check the process a portion of the foot was removed, but in a few months gangrene appeared in the fresh stump. He then came into this hospital in the service of Dr. D. N. Eisendrath, who, realizing the fact that the disease is associated with narrowing of the tibial vessels fairly high up in the calf of the leg, made an amputation of the leg above the knee. After two years the patient returned to the hospital with gangrene of the toes of the left foot, which had gone on to complete destruction of the first phalanx of the first and second toes. The foot as a whole was cold, blue and cyanotic, and was the seat of a great deal of pain. We began our treatment three weeks ago, and today you see that the foot, instead of being blue and cyanotic and cold, has become warm. Here, under this treatment, a line of demarcation has formed on the gangrenous first and second toes and both surfaces are healing with no signs of gangrene remaining. I want you to note how this is cicatrizing. The foot looks swollen and red. This is due to the edema that appears when you crowd the fluids. Instead of amputating I simply removed the dead toes, and I feel very sure of saving the foot.

The disease is peculiar, in that it affects the Jewish race more than other races. Next in frequency it is found among the Japanese. Men are affected more commonly than women, in the proportion of 8 to 1. I quote Da Costa when I say that the disease usually, but not always, begins in the left leg. It may start almost simultaneously in both legs. If it begins in one leg, the other tends to become affected sooner or later.

It comes on with attacks of severe pain in the toes, foot, or leg, the extremity feels cold and looks bloodless, and no pulse can be detected in the dorsalis pedis and posterior tibial arteries. Such attacks are at first brought on by cold, later they appear to arise spontaneously.

When the foot is warmed some color returns and feeble pulse may be appreciated. Many of these patients get so that any attempt at walking causes violent pains in the calf muscles, pain so violent as to make the victim limp in torture or at once stop walking (*intermittent claudication*).

After a case has lasted a number of months *erythromelalgia* may develop. In this condition when the foot is hung down the toes and dorsum rather rapidly grow bright red.

After a case has lasted for many months it will be impossible at any time to detect a pulse in the dorsalis pedis or posterior tibial. The patient is worn out with violent pain and cannot walk. Whenever the foot hangs down it becomes red or cyanotic. A bleb or ulcer may form upon the foot or great toe; it is sure to be intensely painful, and finally dry gangrene occurs.

The characteristic combination is violent pain, with absent pulse in the dorsalis pedis and posterior tibial arteries.

Da Costa says that he has never seen the slightest lasting benefit from medication. Sooner or later these cases come to amputation. In some cases violent pain compels amputation even before gangrene begins. Gangrene imperatively calls for it. Not unusually, weeks or months after amputation of one leg, the other leg has to be sacrificed.

The amputation should always be above the knee in order to be well above the thrombi in the vessels. Surgeons have used Moskowicz's test to determine where to amputate. Moskowicz applies an elastic bandage from the toes to high up the thigh, puts in place the tourniquet band, and removes the bandage. In five or ten minutes he removes the band and notes the color of the limb as it is invaded by reactionary hyperemia. This wave of color travels toward the periphery. High up the extremity the reactionary blush appears quickly. The

nearer the area of vascular obstruction, the slower the manifestation of color. In doubtful areas the blush comes slowly and imperfectly and patches of white show here and there. In a region of total ischemia no reactionary blush occurs. Operation must be performed in the region where there is a complete red reaction, and never through an area where anemic patches are noted. Since Carrel's studies on reversal of circulation surgeons have attempted to prevent this and other forms of gangrene by arteriovenous anastomosis.

Early in a case, when we may assume that the veins are free from clot, the operation is clearly justifiable and may perhaps prove successful. Bloodgood has had success in a case which seems to have been of this type.¹

I feel that we are under moral obligations at least to try the treatment which I have outlined before amputating the affected extremities in these cases. Before giving the treatment it is important to rule out syphilis, because syphilitic endarteritis may cause a similar clinical picture and, of course, requires specific treatment. I can see no reason why it cannot be used in diabetes.

This man has been getting, during the last ten days or two weeks, 4 to 6 liters of the solution a day by means of the duodenal tube. We are using this method entirely, and find it both convenient, comfortable for the patient, and efficacious.

NOTE.—Since this clinic was given a case of diabetic gangrene involving the great and little toes of one foot has healed under the above treatment combined with regulation of the diet.

¹ Bernheim, in Amer. Jour. Med Sciences, February, 1912.

CLINIC OF DR. E. WYLLYS ANDREWS

MERCY HOSPITAL

VARICOCELE: NEW, OLD, AND COMBINED METHODS OF OPERATIVE RELIEF

Summary Hypertrophy of the scrotum and varicosities in the wall of the scrotum frequently a source of discomfort even though the varices in the cord have been removed, shortening of the scrotum by operation sometimes gives relief, but a combination of both methods avoids all the objections to each and saves much time, technic of the Ferguson operation, use of a double row of stitches permits effective prevention of postoperative hemorrhage

THE operation here shown is a shortening of the scrotum by using a double line of sutures. It is a modification of the ancient operation of Sir Astley Cooper and the various forms of clamp amputations of the scrotum, and has all the advantages and none of the drawbacks of these methods. On comparing notes with the late Dr. Ferguson I found that each of us had published the technic as original, but that his paper had antedated mine. It should, therefore, be called "Ferguson's operation," if it deserves a separate name.

In practice I usually combine vein resection with shortening of the whole scrotum. It is true that when careful vein resection is done the cord mass is reduced in size and length and the varices cured permanently. This lifts the testis when too dependent, but what disappoints some patients is that the redundant scrotal sac persists even while the testis is held up close to the pubis. One cause of this is the acquired hypertrophy of the scrotal skin and dartos, and occasionally the cause is seen to be the presence of varices in the scrotal tissues apart from the cord and testis. These, of course, may escape obliteration when the plexus on the cord and epididymis is resected.

When the scrotal skin remains hypertrophied in spite of curing the varix of the cord, there remains a disability for manual labor in some laboring men due to the weight and intertrigo of the redundant scrotum, especially in warm weather. If a suspensory still has to be worn, the patient thinks he is not cured, although pain and dragging from the testis itself has theoretically been relieved.

On the other hand, if the scrotal sac is so shortened as to be round instead of pendulous—of the canine rather than the capricorn type—the veins are so far supported that they empty themselves just as they do in the recumbent position, and the patient feels relieved quite as well or better than when only vein surgery has been attempted. This clinical observation I have made many times. It probably explains the popularity of the old Cooper method which could be done even before antiseptic times without much risk, whereas vein resection by the old methods caused quite numerous accidents involving, we are informed, occasional gangrene of the testicles. Sometimes I found that scrotal shortening alone did not empty the varix wholly, but that it would remain as a visible or palpable tumor in the upper scrotum and canal. While this is the exception rather than the rule, I find it expedient and satisfactory of late to combine both methods in the same case. I therefore begin by opening just below the external ring and, making as dry a dissection as possible, at once clear the cord mass and divide its elements into two bundles. One bundle, containing the vas deferens, artery, nerve, and a liberal cluster of veins, is drawn aside to be preserved. Anastomotic branches make the separation a little difficult, but usually the two bundles are drawn apart by blunt dissection only, the one to be destroyed, the other to be preserved.

The mass of veins marked for resection should be ligated carefully in two places 10 to 15 cm. apart and the intervening portions removed, after which the stumps are tied to each other, thus shortening the whole cord and suspending the testis.

Senn advocated suturing the vertical skin incision transversely in order to shorten the scrotum, but the effect thus obtained is hardly noticeable in bad cases. I therefore proceed at once to

amputate the lower half or two-thirds of the scrotum, converting it into its own suspensory bag and incidentally destroying whatever loops and varices are scrotal rather than testicular. Sometimes these are an important factor and sometimes not observed at all. One is apt to remove too little of the scrotal sac. The operation will be disappointing even if a large piece—one-half or more of the scrotum—is amputated, if much loose sac is left above. The skin has a surprising tendency to stretch out again when enough apparently was taken away, and may be still too long within a few weeks of the operation. I therefore remove enough to make it slightly tense, holding the testes rather snugly up against the pubes, as shown well in the photographs of this case. Such a case, which looks uncomfortably tight and globular, will, in fact, be quite pendulous enough after healing. This is partly due to the relaxation of the upper stitch line and partly to an unexpected elasticity of this tissue. Unlike any other part of the skin, except possibly the palpebral integument which it resembles, it is soft, devoid of adipose, and of rubber-like elasticity (Fig. 202, 1, 2, and 3).

So apparently simple an operation as cutting off and sewing together this scrotal sac is tedious and full of embarrassment unless done with certain precautions. The scrotal walls have numerous arteries and veins. The testes when their support is removed roll out as if from a cavity, apparently naked, but, of course, really enmeshed in the dartos. Vessels retract out of sight and hemostasis is tedious, as is also the closure with stitches. If hematoma, infection, or both occur in the wound afterward, it is not to be wondered at.

All these troubles are apparently overcome by the clamp operation. The varicocele curved clamp is placed at the right level, holding the skin together and the testes well supported while the segment below is cut off and the stitches inserted. Unfortunately, this instrument has defects. While holding the scrotum in position, it also may compress the blood-vessels. Their cut ends may not be seen and tied. When the suturing is complete and the blades of the clamp are opened, bleeding may go on at the time or later internally into the scrotal stump, forming



a globular hematoma which almost certainly prevents primary union. In one case I saw severe hemorrhage six hours after such an operation.

The method I advocate avoids all these objections and saves much time. It is a substitute for the old varicocele clamp in the form of a double suture line, the first or upper row of stitches being placed about 1.5 or 2 cm. above the cut edges. This is inserted by a single through and through mattress or trocar needle in loops about 2 cm. apart, the mattress stitch alternately appearing on each side. For a time I used a double mattress or shoe lace stitch, but abandoned this because it sometimes strangulated the distal segment and caused it to slough off. The single back and forth mattress suture line leaves each segment of the sewed skin with a vascular pedicle. This line of continuous deep or retention stitches should begin at the perineum and end at the root of the penis, supporting and crowding upward the testis and marking off three quarters or more of the scrotum below. It acts like a curved clamp and is intended to support the superficial stitch line, which is later inserted. Plain catgut is durable enough for this purpose.

The next step is the amputation of the part below, which is done with the scissors or knife in a sweeping curve $1\frac{1}{2}$ or 2 cm. below the first stitch. The wound edges are held firmly together by the neighboring stitches, but it is at once noticed that numerous large vessels bleed freely—usually half a dozen spurting arteries and some large gaping veins. This is one merit of the operation, that it allows these vessels to be seen and ligated individually, whereas with the clamp they escape and retract into the loose dartos. When each bleeding point is carefully secured, the skin edges may be rapidly brought together with small plain catgut stitches. These edges are, in fact, already together and only need to have their outer edges neatly turned into good contact. This system of double suture line is of great value in all plastic

Fig. 202.—Varicocele case. 1. Redundant scrotum stretched and mattress suture inserted. 2. Scrotum removed 1.5 cm. below mattress suture. Bleeding vessels ligated separately. 3. Skin closure completed by light running suture of distal segment.

surgery. Here it almost never gives anything but quick and sure primary healing. The ridge-shaped suture line stretches or flattens out in a week or less by the absorption of the catgut, at which time the cuticular union is smooth and strong. In some cases a collodion seal is all that is needed after the oozing of the first few hours.

CLINIC OF DR CARL BECK

NORTH CHICAGO HOSPITAL

TREATMENT OF OBSTINATE SCIATICA

Summary Necessity of ascertaining the cause of the pain before attempting curative treatment, stretching the sciatic nerve—danger of producing motor paralysis technic of the treatment of a case of intractable idiopathic sciatica by prolonged nerve-stretching without open operation

THE treatment of sciatica in most instances is non surgical, and must, of course, vary in accordance with the pathologic conditions at the base of the symptoms For instance, a continuous pain along the sciatic nerve due to pressure from a tumor will require treatment different from that which relieves the spasmodic attack of pain due to acute rheumatic trouble Treatment applicable to a case of alcoholic neuritis will not be suited to a patient with syphilitic inflammation of the nerve trunk leading to the same complex of symptoms, and the treatment of sciatic inflammation due to infected tonsils will again require different therapy In other words, treatment must always be appropriate to the etiologic factors concerned in each individual case There are cases of pains along the sciatic nerve in which the etiology is not clear Pains which are persistent and resist any of the usual treatments, such as bathing electricity, hot or cold applications, resist even semisurgical measures among which may be mentioned injections of salt water or alcohol along the sheath of the nerve, cauterization of the skin or counterirritation with other agencies

Formerly we used to see a great many cases of sciatica treated according to a method which was introduced by Hueter, a German surgeon, active during the 80's of the last century This procedure consisted in the stretching of the nerve The

sciatic nerve can be stretched in either one of two ways. We find that if we take hold of the leg while the patient is flat on his back and flex it at the hip, while the knee-joint is kept in extension, we can exacerbate a pain in the sciatic nerve even to intolerability. This is one of the diagnostic points which we often use to distinguish sciatic-nerve affection from other conditions with which it may easily be confused, such as hip-joint disease or coxitis. The pain is increased by this procedure because the nerve is stretched.

Older surgeons will remember the operation which we used to do in obstinate cases, which consisted in laying bare the nerve in the gluteal region, hooking it up with the finger, of course under anesthesia, and raising it up as high as possible under a tension of 15 to 20 pounds. This procedure was based upon the physiologic fact that the transmissibility of impulses by a sensory nerve is reduced considerably by stretching of the nerve-fibers. One may even produce motor paralysis if one becomes overzealous when stretching the sciatic, but function will return after a time. The sensory nerve can be easily affected for a long time, and, while sensation returns, pain transmission is gone for a long time, while the reactive inflammation which takes place, due to the stretching process, may remove inflammatory changes along the nerve and thus cure a case of persistent neuritis permanently. In fact, quite a number of cures in cases of sciatic pain resistant to other measures have been reported following nerve-stretching.

Twenty to twenty-five years ago I used to do a number of such operations. They are surgically easy, although not harmless, and if one does not use discretion in stretching, as we said before, total paralysis may follow such a procedure. As a rule, however, it does not. Although my results in those early cases were satisfactory, I have not met with many instances in the last fifteen or twenty years in which I have felt justified in carrying out this very radical treatment. Most of my cases lately have yielded to diathermy, high-frequency currents, subcutaneous salt-water injections, and other conservative procedures, although I have met with a few extremely obstinate

instances, among them the case which I shall demonstrate to you this morning

This patient, a young man, born in Russia, a very bright and successful individual, developed a sciatic pain, which gradually grew in intensity to such an extent that he would roll on the floor with pain when the attacks overtook him. This trouble persisted for months in spite of the numerous lines of



Fig 203—Position of patient undergoing treatment for intractable sciatica. A wire connects the plaster cast on the outstretched leg with a similar cast about the hips. This wire can be shortened and lengthened at will. Additional support in this case is furnished by a special supporter instead of by a roll as usual.

treatment which were tried. The patient went from doctor to doctor, dispensary to dispensary, hospital to hospital, until he finally came to fear that nothing except the amputation of his leg would do him any good. His tonsils and adenoids were removed, his teeth were overhauled, and no pathologic condition could be found to explain the sciatica.

I decided to give this case a trial by a method which I had

used successfully in a number of cases before. In this particular case of extremely severe sciatica it has now given complete relief for weeks, so that the young man, who had lost his position and his livelihood, is now beginning to work again, and has absolutely no sensation of the former pain in his sciatic nerve.

The treatment was as follows:

The patient's leg was put into a plaster cast in a perfectly extended position, and then, while the trunk was held flat on the table, back down, the leg was raised from the table, flexed at the hip, and suspended on a roller, just as we do in the treatment of fractures of the femur in children, or fastened with a wire to a plaster ring around the abdomen (Fig. 203). He was not able to stand this at first for longer than about fifteen to twenty minutes, and had to be relieved for about the same time. Gradually he became able to endure the position of flexion for an hour, and, later on, for more than an hour, and gradually also he was able to increase the degree of flexion, until ultimately he could keep his leg for a day in quite a flexed position, and his pain disappeared. This was the time when we had to watch closely for evidences of diminishing sensation in the part. The threshold for sensory stimuli applied to the skin became higher and higher; the distance between the points of the sensitoscope became larger and larger, and finally definite anesthetic areas could be outlined. The patient was still able to move his toes. Then we gradually reduced the duration of the periods of flexion and allowed the patient to sit up and to walk. Sensation gradually returned. Within ten days under this treatment the patient became free from pain and was able to walk on his leg without any trouble. This has been my experience in most instances of intractable idiopathic sciatica which I have treated by this method. This man had been taking anodynes, but he is now free from pain and takes no medicines. There is still, weeks after the termination of the treatment, numbness in his foot and along the fibular region of the leg.

CLINIC OF DR DANIEL N EISENDRATH

COOK COUNTY HOSPITAL

GUNSHOT WOUNDS OF THE SKULL

Summary A patient with a penetrating wound of the skull produced by a revolver bullet types of gunshot wounds of the skull opinions of English French and German surgeons complications—hernia cerebri edema hemorrhage infection, streptococcus encephalitis brain abscess—danger of rupture into ventricles with resultant basal meningitis, treatment—indications for operation management of the complications

You remember some weeks ago we took up the subject of fracture of the skull in its relation to contusion, concussion and compression of the brain I showed you a number of cases illustrating the different types of concussion and contusion I want to take up with you today another subject in relation to the skull which has come to be of tremendous importance in war surgery—namely, gunshot wounds of the skull

This boy nineteen years of age, was brought to the hospital on December 13th forty eight hours ago at about midnight The history was that he had made an attempt at suicide by shooting himself with a revolver He entered the hospital in a semicomatose condition The examination revealed a wound of entrance in the temporal region on the right side and a wound of exit in the median line close to the junction of the parietal and occipital sutures This is called a penetrating or through and through variety of gunshot wound to distinguish it from the two other classes namely, the tangential in which the bullet plows a furrow along the course of the vertex, and the punctured or depressed variety, which causes a localized injury of the skull In this case both the wounds of entrance and of exit are relatively small, and the x ray shows only a slight splintering of bone at the wound of exit (Fig 204) But we also

see a condition which is very frequently a complication of gunshot injuries of the skull, and which in this case is well marked at the wound of exit, namely, a prolapse of the brain or a hernia cerebri. This is due to acute edema of the brain as a result of the laceration and contusion of the brain tissue. Such a prolapse may be of a relatively innocent nature when infection is not present, as seems to be the case here. It is covered with granu-



Fig 204 —Gunshot injury of skull. Revolver bullet entered right temporal region. The wound of exit is seen at middle of vertex. Note comminution of skull at point of exit of bullet and particles of missile in track through brain.

lation tissue, and unless infection supervenes epidermization takes place from the surrounding scalp, bone tissue rapidly forms from the skull, the prolapse recedes, and is soon covered without leaving much of a defect in the skull cap.

In the case before us the patient has developed a facial paralysis on the left side and considerable ecchymosis of the right eye. Let us see if we can demonstrate the facial paralysis.

One of the best methods of doing this in patients who are semi-comatose is to make pressure over the supra orbital notch on the paralyzed side. You will note that the left side of the face does not move in response to this procedure, while the right is drawn up as though the patient were grinning.

This patient's temperature has risen as high as 101.6°F and he appears very stuporous. When he first entered the hospital his mental condition was much worse than at the present time, he now comprehends questions and directions. Upon entrance the pulse was 156, very rapid and weak as a result of a considerable degree of concussion of the brain, but this has gradually receded until it now averages about 76. Respirations are normal. Such symptoms indicate that there is no cerebral compression because if there were compression his pulse would come down to 40 or 60. If he had a compression as a result of a laceration of the middle meningeal artery his blood pressure would likely be high. If he were suffering from a compression plus a contusion, what would be the condition of his spinal fluid by lumbar puncture? It would be under increased tension and probably would be bloody. What do you suppose the symptoms which he came in with are due to? To concussion. Supposing that you were called to see this man, and upon examination you found the patient in a stuporous condition, with a pulse of 100, and a left-sided facial paralysis but no paralysis of the extremities, what—remembering that it is not only the skull injury that is of importance but more so that of the intracranial contents, especially the brain—would be your treatment and prognosis? You have given us the diagnosis, that is, cerebral concussion. He has no signs of compression and no signs of contusion, although from the apparent course of the bullet there must have been some destruction of brain tissue. You will be guarded in your prognosis. You would say that if this boy does not develop evidences of infection within the next forty-eight hours—and remember a cerebral infection shows itself within forty-eight to seventy-two hours—his prognosis as to life is excellent. What is your prognosis as regards the facial paralysis? That will recover just the same as muscle regenerates.

The muscular power will not be as good as before, but there will be substantial improvement. The prognosis is not as good with gunshot wounds as with cerebral contusion due to blows, etc., but I would not give an absolutely unfavorable prognosis. The indications for interference are two: First, signs of compression of the brain; and, second, evidences of actual or threatened sepsis.



Fig 205—Gunshot injury of skull. Penetrating (revolver) wound of skull and brain. Bullet lies (fragmented) in posterior fossa of the skull. No symptoms

In this case we have made up our mind that we are not going to operate. Is this hernia cerebri a serious matter? I do not think so unless an infection occurs. If we keep it clean, it will gradually recede. The treatment then will be to clean the wounds and keep the patient at rest in bed, under what we would call "watchful expectancy." Keep him quiet, with the assistance of morphin and bromids if necessary, until the effects of the cerebral contusion are over.

It is advisable to take an x ray of these cases as early as you can in order to see the extent of the injury and to find the location of any foreign particles, such as bullets and, in wounds received on the battlefield, particles of shell. Wounds in war are seldom as clean cut as these unless they are made by machine gun bullets. If there are particles of bullet or bone that can be easily seen in the wound take them out, but do not go deep into the brain proper (Fig 205)

I have read a great many articles during the past two years written by the most distinguished surgeons of the various countries now at war in Europe. Their views in regard to the surgery of gunshot wounds of the skull have undergone a complete revolution. This is especially true of gunshot wounds of the skull because of the trench fighting and the difference in the character of the weapons used in the present war as compared with former wars. In order to acquaint you with the most important facts brought out in these articles I shall quote some of the principal contributions from the English, German and French publications.

The articles of Whitaker¹ Trotter² and Sargent and Holmes³ are the most important ones from the standpoint of the English army surgeons. Whitaker advises immediate operation in practically all cases seen within the first three days. Early decompression (which is secured by excising the injured or septic area of the scalp and enlarging the skull defect until $\frac{1}{2}$ inch of normal dura is exposed) is the best method of preventing a prolapse of the brain. This is especially true of penetrating injuries when the wounds of entrance and exit are situated close together. No prolonged search for projectiles or small bone splinters should be made, as the latter are often extruded spontaneously. Roentgenographic examination is very desirable but is not always to be obtained. Whitaker distinguishes between streptococcus and staphylococcus infection. In the former there is a tendency for the infection to spread rapidly in all directions, and prolapse if present will become very large, the

¹ *British Jour Surg* 1916 3 708

² *Ibid*, 1915 2, 520

³ *Ibid* 1916 3 475

adjacent brain undergoes necrosis for a considerable distance, and meningitis spreads rapidly from the injured area. Invasion of the lateral ventricle is not as common as in staphylococcus infections because the latter tend to produce localized abscesses which, in turn, are apt to burrow, so that the ventricle is likely to be invaded through a narrow tract where the wound in the brain is deepest and approaches the ventricle (Figs. 206 and 207). The relation of the areas of infective encephalitis to ventricular invasion, causing death after an interval of days

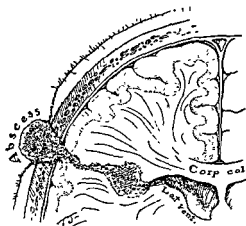


Fig. 206—Abscess near surface of brain causing prolapse and invading brain tissues as far as wall of lateral ventricle (Fritz Mueller)

or weeks, is one of the most important contributions to the surgery of gunshot injuries of the brain, and is frequently referred to by German writers.¹

In cases not seen for fourteen or more days Whitaker advises expectant treatment unless the roentgenogram shows splinters of bone driven into the brain. In the intermediate period (seven to ten days after the injury) operation is indicated by (a) active sepsis in a badly drained wound, (b) signs of cerebral irritation, *e. g.* convulsions, restlessness or delirium, (c) symp-

¹ Infection in Gunshot Injuries of the Head, *Beiträge z Klin Chir*, 1916, 100, 618, Burckhardt.

toms of cerebral compression, such as severe headache, coma, and slow pulse.

If acute and active scalp infection is present, the scalp should be thoroughly drained for twenty-four hours if possible before the decompression is done. Cases with clean scalp wounds but with depressed bone fragments or foreign bodies of moderate size, which have been localized and are not doing any damage, can be operated at the convenience of the surgeon.

Operation in the intermediate stage (seven to ten days after injury) is contraindicated (a) when there is no displacement, sepsis, or foreign body; (b) when no evidence of sepsis is present, but with a foreign body not causing progressive symptoms,

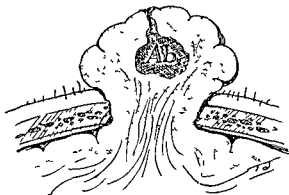


Fig. 207 —Hernia of brain with abscess in prolapsed brain tissue

and (c) if a primary operation with free drainage and sufficient decompression has been done. Whether one should operate or not is a question when (a) the general and local conditions appear to be hopeless, (b) if patients who have been operated upon become dull and apathetic, Whitaker believes that in such cases hemorrhage into the ventricles has occurred without primary infection, and that there is danger of secondary invasion of the ventricles after a considerable period and with a fatal outcome, as the result of a staphylococcus encephalitis (c) Cases with external wounds healed but with a foreign body difficult to reach, and with symptoms of grave cerebral contusion but not compression. Operation will be of no benefit in this last-named class of cases.

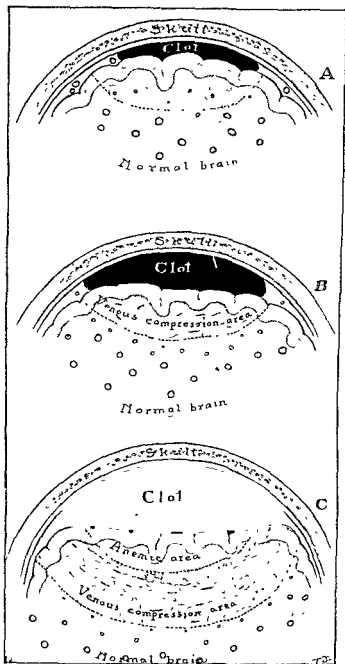


Fig 208—Scheme to illustrate the circulatory changes accompanying an intracranial (subdural) hemorrhage (From Trotter, British Journal of Surgery)

Trotter agrees with the majority of French and German surgeons that an extra- or subdural clot does not destroy the brain unless its presence is prolonged, hence the outlook is hopeful. Other causes of compression are fracture and the transit of a bullet. In his article Trotter shows an excellent diagram (Fig 208) to illustrate the circulatory changes which accompany an intracranial subdural hemorrhage. He also gives a splendid

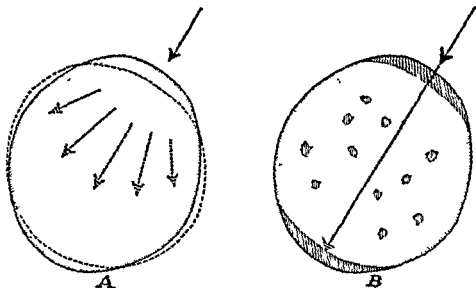


Fig 209 —Diagrams to show the distribution of force within the skull when the head strikes a flat surface and sustains injury by deformation without direct fracture (Trotter) A, The factor of hyperacute compression. A general deformation occurs, the skull tending to assume momentarily the form shown by the dotted line. The effect is to produce a sudden encroachment upon the intracranial space and wide spread momentary capillary anemia. B, The factor of the impact of the skull on the underlying brain. At the point struck direct contusion is produced, diametrically opposite polar contusion. Between these two are scattered foci of contusion of the brain substance. The lesions are indicated by the shading.

review of the physical effects of a gunshot injury of the brain, which are considered under the following headings. First, those due to deformation of the skull, either generalized or localized (Fig 209), second, those due to the transit of the bullet, the chief factor concerned in regard to the latter being its velocity. This is well shown in Fig 210. The intracranial contents act as a homogeneous medium and not as in hemorrhage

by displacement of intra- and extravascular fluids in the order of their pressures. Third is the question of the injuries associated with localized fractures or those inflicted by small or pointed objects, fragments of shell, and tangential wounds. In these cases one is apt to underestimate the extent of brain damage owing to the relative absence of concussion and compression.

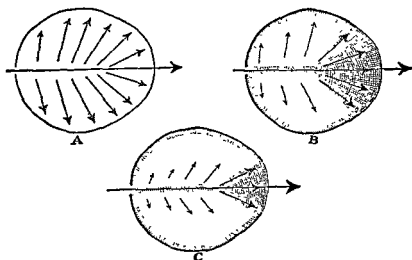


Fig 210—Diagrams to show mechanical effects of a high-velocity bullet wound of the skull with complete transit of the bullet (Trotter) A, At very close range The energy of the bullet is distributed throughout the skull, most powerfully in the direction of the shot, but powerfully enough from the moment of entry to produce a general bursting effect over the whole skull B, At submaximal velocities. The energy yielded by the bullet falls off first near the point of entry, and is most marked in the direction of the shot—as shown by the length and thickness of the arrows When the distributed force is relatively small the skull remains intact (thick outline), but the brain is apt to be contused against it (shading). Where the distributed force remains very great the skull is liable to bursting (thin outline), and the brain to disorganization (dotted area). The contusion along the bullet track is moderate in amount. C, At a less velocity The mode of distribution of force remains the same, but the amount of destruction is less. The greatest damage is still found in the region of exit of the bullet

The physical effects produced by the mechanism just described are: first, a direct destructive effect upon the brain; second, reactionary swelling which we speak of as acute cerebral edema; third, hemorrhage, the clinical types of which are char-

acterized by signs of grave and extensive hemispheric compression, by obviously grave injury without localizing signs, or by signs of cerebral irritation which overshadow everything else, fourth, a localized cerebral lesion due to cortical hemorrhagic contusion, fifth, compound depressed fracture. In the latter class, even though there is only a very small punctured wound of the scalp, the brain may be injured even in the absence of symptoms of concussion. Foreign substances have been driven into the brain in a majority of these cases, hence it is necessary to take a roentgenogram at an early period. Late cases may have cerebral symptoms due to the accumulation of blood or pus. All cases in which the skull has been penetrated demand operation whether they present cerebral symptoms or not in order to limit sepsis, remove foreign bodies, and provide for the escape of blood and disorganized brain tissue. If such cases are treated expectantly there is great danger, first, of spreading infections of the brain and meninges starting from the collection of pulpified brain, blood, fragments of bone, and foreign substances which are apt to be retained in the wound, and, second, if there is no supuration and the wound heals the function of the brain is likely to be interfered with from the retention of such materials. Deeply located bullets or foreign bodies should be left. The wound should be dressed widely open. Even if the patient comes late after the infective conditions have developed the same treatment should be carried out. Wet dressings are preferable to dry.

There is complete unanimity of opinion among the majority of prominent British surgeons who have written on gunshot injuries of the skull received in the present war, that no penetrating injury, especially if seen early, should be treated without a thorough cleansing of the wound and early decompression.

Sargent and Holmes do not agree with the above practices. They believe, as do some of the German surgeons, that operation is almost always necessary in tangential and punctured (depressed) injuries because of the number of bone fragments and foreign bodies which have been driven into the brain. Operation, on the other hand, is seldom indicated in penetrating (through and through) injuries. In their experience the cerebral edema

which follows gunshot injuries is rapidly recovered from if infection does not occur. As in civil practice, the extent of the injury to the brain is of far more importance than that of the skull. They divide the injuries into superficial and deep, the latter only requiring drainage. The depth of the injury can be determined by the mode of infliction, the appearance of the wound, the roentgenogram, and the neurologic symptoms. The latter seldom if ever call for operation at an early stage and less so at a later one. If progressive hemorrhage causes compression, operation should be performed, but if the symptoms of compression are due to edema, only lumbar puncture is indicated. Sargent and Holmes also advise against operation until after three to five days so that adhesions between the various injured tissues may have time to form.

In these two respects they differ from the majority of other surgeons on both sides, who strongly advocate early decompression in all cases and who do not fear the absence of adhesions around the area of injury. Burckhardt and others have called attention to the fact that a meningitis from the original wound is comparatively rare, and that infection spreading from the track of the projectile into the lateral ventricle with resultant basilar meningitis is far more to be feared than a convexity meningitis. Early operation, therefore, will relieve the cerebral edema if non-infective and will permit drainage toward the surface instead of toward the ventricle.

Sargent and Holmes believe, as do all others who have written on the subject of war surgery, that a stereoscopic roentgenogram is indispensable, and also that one should not search for foreign bodies unless they are near the surface. The finger is the best instrument for removing bone or shell fragments, and they prefer a perforated metal tube for drainage. They believe that lumbar puncture is one of the most valuable aids in relieving cerebral edema and controlling the tendency to prolapse. I have called attention above to the divergence of opinion on this subject, the majority of writers placing little if any reliance upon lumbar puncture as a therapeutic measure. Many of the early disturbances of function disappear, since they are due to

concussion, cerebral edema, and compression of vessels rather than to local brain destruction.

Bleeding from the longitudinal sinus is best controlled by packing with muscle. Improvement after injuries of this sinus are slow, but the outlook is very encouraging.

The most important contributions from the German side were read at the first and second War Surgical Congresses held at Brussels in 1915 and at Berlin in 1916. Those especially interested will find a series of issues of the *Beiträge zur Klinischer Chirurgie*¹ devoted to war surgery a very valuable addition to the literature from the German side.

Tilman² called attention to an important observation at the first War Surgical Congress in Brussels in 1915, viz., that the inner table may be extensively comminuted and the brain much contused, even though the outer table is intact. This is especially true of tangential injuries, more so than in the depressed or punctured variety. Through-and-through (penetrating) cases usually die at once, and those who survive show much comminution at the wounds of entrance and exit. If the latter are small, the case may be treated expectantly, but if large, operation should be done early. Tilman's views concerning the effects of hemorrhage are in accord with those of English surgeons, that there is more danger from infection and acute cerebral edema than from intracranial bleeding. A high temperature may be indicative of absorption and not of infection. A non-infective encephalitis (acute cerebral edema) may at times be followed by softening of the brain (encephalomalacia).

One of the most important contributions to the subject of infection in war injuries of the brain is that of Burckhardt.³

Burckhardt says that antebellum views have been completely changed. Many patients who survive the immediate effects of the injury succumb from a suppurative meningitis after an interval of a few days to many weeks. He has confirmed the observations of Chiari⁴ that such sudden deaths are, as a rule,

¹ *Beiträge zur Klinischer Chirurgie*, Bd. 96-101. *Chirurgische Kriegs Hefte*.

² *Ibid.*, 1916, 100, 618.

³ *Ibid.*, 1915, 96, 454.

⁴ *Munch. Med. Woch.*, 1915, 62, 596.

due to the extension of an area of suppurative encephalitis into the lateral ventricle. Autopsies show the dura adherent to the skull and very little if any evidences of meningitis in the vicinity of the original injury. The meningitis is most marked at the base, due to an extension from the ventricle, and in the latter one can see how the area of encephalitis has involved the wall of the ventricle. Direct penetration of the ventricle by a bullet is much less frequent than by splinters of bone, especially in tangential injuries.

The clinical pictures of two general types are familiar to all. The first is characterized by rapid recovery in the beginning, with restoration of consciousness and improvement of the pulse, followed on the third or fourth day by a sudden or a gradual rise of temperature and death in from one to three days. In the second type everything seems to go well; fever, if present, decreases, focal symptoms recede, the patient may even have left his bed, or a prolapse may have formed which is being covered with granulations; when suddenly, after weeks, headache appears, the patient becomes depressed, shows symptoms of cerebral irritation, and may even become maniacal. At the same time there is a rise of temperature and the classical symptoms of meningitis, such as rigidity of the neck, etc., appear to be followed shortly by death. There is still another way by which a late infection of the ventricles may occur—a wound in the brain, whether it stays flat or whether a prolapse occurs, contains at its surface many necrotic masses of brain tissue. When these are desquamated the ventricle may finally be opened and a fistula discharging cerebrospinal fluid produced through which the ventricle is infected.

Meningitis due directly to the injury or to the operation is very rare in Burckhardt's experience. He warns against careless puncture for abscess or too prolonged use of a drainage-tube, as both of these may be followed by ventricular infection. Extensive involvement of the frontal lobes gives a better prognosis than similar involvement of other parts of the brain because of the fact that the ventricles do not extend far into them.

Prolapse of the brain is due to a lack of space within the

skull and may be composed of either disintegrated or acutely edematous brain tissue. A prolapse occurring in war injuries is always, according to Burckhardt, an evidence of an infective edema of the brain. If the inflammation is of a mild character both it and the brain prolapse gradually subside. If an encephalitis exists the ventricle is at last involved and death occurs. If a brain abscess is present, recovery may occur if the pus is given an opportunity to escape externally.

The prolapsed edematous brain becomes covered with granulation tissue, which becomes firmer and is gradually covered by epithelium if the infection recedes. In a prolapse associated with a progressive disintegrating encephalitis the surface is covered by necrotic masses which may be desquamated, and thus lay open a diverticulum like projection of the lateral ventricle which often extends into the prolapse. Such a process is followed by infection of the ventricle, meningitis, and death.

The prospects of success after Burckhardt's experience of 306 cases are greater in immediate operations. The only exceptions are smooth, penetrating wounds, in all other cases an operation may prevent encephalitis and brain abscess or will permit of drainage for an infected ventricle. The dura must be exposed until it appears normal and then incised until the entire area of disintegrated brain is exposed. Punctured wounds should be operated on by all means, because in an unexpectedly large percentage of cases it has been found that the projectile remains outside of the skull and can easily be removed although it may depress the bone itself. An abscess which can be prevented by an immediate operation is very liable to form around a projectile and bone fragments which are allowed to remain in the wound. If the missile has penetrated the brain, suppuration is almost sure to occur if it is not removed, the exception being infantry bullets and bomb fragments less than the size of a pea. From Burckhardt's observations at autopsy and in the living it has been determined that, as a rule, a projectile does not stay in the midst of the brain tissue. Projectiles are often found either outside of the skull itself or in the opposite wall of the skull. Quite often the projectile will be found lying free in the

cranial cavity (see Fig. 205). It is much better to wait until an x-ray has been taken than to do unnecessary damage by exploring the brain in vain. In no portion of war surgery does one need an x-ray as much as in punctured fractures of the skull because of the fact that missiles are not as often found within the brain substance itself as external to it, often on the side opposite to that of entrance. Only small bomb particles remain in the brain tissue.

In regard to the treatment of prolapse, the following principles are laid down: If a prolapse exists, one should operate. In acute prolapse, as a result of sudden closure of a cerebrospinal fluid fistula, enlargement of the cranial defect is always indicated to allow escape of pus from the ventricle. One must not expect a brilliant result from an operation for prolapse because it is really only a decompression. Under no conditions should a prolapse be amputated. To puncture a firm prolapse is dangerous because in both amputation or puncture of a prolapse one is apt to open a ventricle. Necrotic areas should be allowed to sequestrate spontaneously. An open-wound treatment is especially indicated in an encephalitis which is breaking down, and also in firm prolapses. Cerebrospinal fistulæ should be dressed daily. In regard to the bony defects, it is astonishing how much they will decrease in size. One should not do a plastic operation too early because the infection may not have subsided and a diverticulum of the ventricle may lie directly beneath the scar. If there are neurologic causes for a plastic operation it is sufficient time to do such a plastic after the symptoms have appeared.

For a long time it was believed that the encephalitis which caused prolapse was directly due to the projectile and the other foreign bodies which were carried in with it. The conclusion has now been reached that germs which are carried in only exceptionally lead to infection in cases of minor degree of destruction of the brain. The infection is predominantly a secondary one in these minor injuries which occurs after the operation. In large areas of brain destruction, on the other hand, the germs which are brought in at the time of the primary injury are the

cause of the infection. Such cases cannot be saved and one should attempt in every way to prevent secondary infection.

V. Eiselsberg¹ made a report at the Second War Surgical Congress held in Brussels in April, 1916. He advises early operation, especially in fresh tangential injuries if external conditions are favorable and the patient does not have to be transported any considerable distance. If these conditions cannot be met, then he advises only that the wound edges be freshened and the largest bone splinters removed. He is strongly against complete suture without drainage as advised by Bárány.

In considering the treatment of skull and brain injuries, V. Eiselsberg divides them into three classes, the tangential, the segmental, and the penetrating. Although the transition from a tangential to a segmental and from this to a penetrating injury is a slight one, he believes such a distinction is advisable.

Tangential.—The patient should be x-rayed and studied for twenty-four hours. Absence of suppuration (much) as well as of general local symptoms in conjunction with a negative x-ray contraindicates interference. The patient should be reoperated at a base hospital, even though a primary operation has been done in a field hospital, if there is much wound secretion or marked mental disturbances, such as characteristic paralyses associated with retention of bone splinters in the wound as shown by the x-ray. In operating upon tangential injuries the bone should be removed until the periosteal elevator can be readily placed between the dura and the skull. The extent of brain injury is then determined by the use of the little finger and foreign bodies removed, and then several gauze strips, lightly packed, are inserted for drainage. If the dura does not pulsate, this indicates an abscess, and a small sharp bistoury should be used to incise the dura and explore for pus. If it is found, a rubber tube should be inserted for only twenty-four to forty-eight hours on account of the danger of pressure-necrosis into the ventricle. Death in these cases is due to a progressive encephalomalacia or to rupture into the ventricle. Perforation into the meninges is not nearly as fatal as into the ventricle. If menin-

¹ Beitrage z. Klin. Chir., 1916, 100, 59.

gitis exists, operation is of no avail. Lumbar puncture is of diagnostic and prognostic, but not of therapeutic value. Of 65 tangential injuries, 30 had abscess. Of these, 2 died. Of the 35 who had none, 11 died.

Penetrating Cases.—We are powerless against infection in the middle third of the tract of the projectile; although the majority of these cases end fatally immediately or after a short time, it is surprising to see some of them run a course without symptoms or reaction. Von Eiselsberg only operates on such cases if there are signs of progressive infection.

Contact or Punctured Cases.—These are best operated on in base hospitals unless there are very severe intracranial pressure symptoms. Although experience with suicide cases in civil practice has taught that the projectile will remain without reaction in a large percentage of cases, and as this view is still held by a number of surgeons, one must not forget that in these war wounds the projectile, especially if it is a large one, within the course of time causes abscess formation. Such an abscess may remain latent for a long period and then suddenly rupture into the ventricle. If the projectile does not lie superficial and cannot be easily removed, it is best to leave it, following its migration by repeated radiograms. The advantages of this practice are two—*i. e.*, better encapsulation of the projectile and greater local immunization. Abscess of the brain may arise through primary infection of the injured area or be secondary to some other focus. The reason for so many failures is that we are powerless to deal with the encephalitis and inflammatory softening of the brain as well as with the meningitis and prolapse. The latter may be due to a deep-lying abscess, and when this is opened recovery occurs, or a prolapse may develop on the basis of progressive suppurative changes of the brain accompanied by an intense edema, and the latter may recede, but the prolapse progresses and leads eventually to death.

In 3 of 16 cases of late abscess there were no symptoms for from seven to ten months, 15 of these patients died; 2 were cases where the abscess developed after plastic operations. Von Eiselsberg prefers a free transplant from the tibia for closure

of the defect in the skull, and used this in 20 out of 27 cases, while in 6 he used the König method

Epilepsy associated with defects of the skull should first be given medical treatment, and if not benefited a plastic should be done, placing fat or using bone covered on both sides with periosteum

Erdelyi¹ believes that brain abscesses may exist for weeks without symptoms. Fortunately, the majority are superficial and should be located with a scalpel. The best form of drainage material is a rubber tube, which should not be allowed to remain longer than forty eight hours on account of the danger of pressure necrosis with invasion of the ventricle

The views of French surgeons are quite in accord with those of the English and German writers. Leriche,² Le Fort, and others advise early operation in all cases. If the dura is intact, it should not be incised

Many of the German surgeons differ in this view from Leriche, and believe that if there is no pulsation of the dura it should always be incised, considering absence of pulsation a sign of abscess

The experience of surgeons in the European War and of my own in civil practice may be summed up as follows

(1) Gunshot wounds of the skull are best divided into the penetrating (through and through), tangential (furrow like), and punctured (depressed) varieties

(2) The penetrating variety does not require operation in either civil or war practice if the wounds of entrance and of exit are small. If the latter are large and especially if they are close together it is best to operate. The middle third of the canal made by a penetrating missile is most liable to infection from retained foreign bodies

(3) All tangential wounds must be operated at as early a period as it is possible to secure the proper surroundings. Stereoscopic roentgenograms should be secured even if it is necessary to wait for twenty four hours, but such an examination is not

¹ Beiträge z. Klin. Chir. 1916, 100, 57

² Lyon Chir., 1915, 12, 293

indispensable. The appearance of the external table is no criterion of the degree of damage to the internal table in tangential cases. Remove all larger bone splinters and foreign bodies, using the finger for purposes of palpation. Do not bore around too much in the brain for deeply located bone fragments or foreign bodies.

(4) All punctured (depressed) fractures require immediate operation, the same technic being employed as in the tangential variety. Hemorrhage from wounds of meningeal vessels and of the sinuses is best controlled by pieces of muscle.

(5) The absence of symptoms of concussion and of compression in the majority of gunshot injuries should not lead one to believe little damage has been done to the brain. The reactive cerebral edema, non-infective in character in many cases, requires decompression, and the degree of so-called aseptic brain prolapse is an index of the extent of cerebral edema from the contused brain areas.

(6) Prolapse of the brain due to infection requires immediate enlargement of the skull and dural wounds. If such drainage is not secured, abscess of the brain occurs very early with rupture into the ventricle, and death at a late period from basilar meningitis. Such a sequel may also be due, after days or weeks, to an infective encephalitis advancing to the wall of the ventricle.

(7) A localized meningitis around the seat of injury is not as much to be feared as infection within the brain due to retained bone fragments and foreign bodies.

CLINIC OF DR JOHN LINCOLN PORTER

ST LUKE'S HOSPITAL

CALCANEOCAVUS: TENDON TRANSPLANTATION

Summary Etiology, pathologic anatomy and clinical characteristics of calcaneocavus treatment—astragalectomy tendon transplantation—the Gallie operation after treatment—points in the application of plaster casts

January 9, 1917

THE first case this morning is a calcaneocavus the so called "talipes cavus" This young woman had a poliomyelitis when she was four years old, and as a result of the poliomyelitis she has lost the calf group of muscles and her heel has slowly dropped on account of the contraction of the plantar fascia and the short plantar muscles and the stretching of the tendo achillis The deformity has resulted in a great deal of disability because the patient has to walk with a limping gait over the inside of the foot, being unable to lift the weight over to the toes Remember that the soleus and gastrocnemius muscles are two of the most powerful muscles in the body, being assets in locomotion by lifting the weight off the ground at each step and transferring it to the toes When that function is lost the patient is unable to lift the heel off the ground, and consequently in order to carry the weight over the toes, has to walk over the inside of the foot Sometimes the calcaneus is associated with varus or valgus, depending on whether the tibial muscles on the inside, or peronei on the outside, of the leg are active and functioning For instance if a patient has lost the calf group of muscles and still has the anterior or posterior tibials active, he will have, besides the cavus, a varus and the foot will be turned inward, which complicates the situation considerably The patient will then have to walk over the outside of the foot in this way (indicating), because it is a physiologic law that when a muscle is paralyzed its antagonist

contracts. In other words, if the muscles on one side of a joint are lost, the muscles on the other side of the joint will slowly contract until they have pulled the joint out of shape. The reverse is also true. If a patient has lost his anterior or posterior tibials, which are the supinators of the foot, but has strong peronei, he will have, besides the cavus, a valgus, which is an extremely disabling deformity, because the heel drops and the foot is turned outward and the patient has to walk on the inside of the foot. Sometimes the malleolus is clear down on the floor. Fortunately in this case the foot is well balanced. The patient is able to dorsiflex the foot and extend it, and able to supinate and pronate the foot slightly, and when the patient walks the toes go down flat on the ground, so that the only problem there is to deal with is to flatten the bottom of the foot and lift the heel and fix the tendon so the patient can put the foot flat on the ground and walk on the toes.

Various operations have been devised for this purpose. The first, and probably the most successful, is the *astragalectomy* of Whitman. Fifteen or more years ago Dr. Whitman, of New York, proposed taking out the astragalus and allowing the tibia and fibula to come right down on the *os calcis*. In doing that he advanced the leg a little, so that the internal and external malleoli should become fixed in a position slightly anterior to their former position, giving the patient a weight-bearing surface nearer the middle of the foot. Then the peronei, if they are active, are cut off and carried backward and attached to the *tendo achillis*. The operation has proved very successful, and it is used in many other deformities about the ankle besides the *talipes calcaneus*. There is one objection to the operation which we have not been able to overcome, and that is, it shortens the leg a distance equal to the thickness of the astragalus. In a case where the leg is already short, which is usually the case, because these paralytic legs do not develop as fast as their fellows, and consequently one leg is almost always shorter than the other, this makes an additional shortening. If we can relieve the deformity without shortening the leg any more it is a very wise plan to do so. In 1912 Dr. Gallie, of Toronto, proposed an anchoring of the *tendo*

achillis to the tibia, the same as you anchor other tendons to the bone in different deformities to prevent a distortion of the joint. The leg in this case is so much shorter than the other leg and the heel apparently can be brought up to a fairly normal position so I am going to use Dr. Gallie's operation instead of Whitman's, as a matter of choice, with the idea of preventing any further shortening.

I told you a few minutes ago that it is a physiologic law that unopposed muscles contract and shorten up. It is also a physiologic law that paralyzed tendons stretch very easily and become overstretched and in spite of the fact that the patient has been walking on the foot with the heel on the ground ever since she was paralyzed, the heel has slowly dropped so that now the os calcis, instead of pointing horizontally as it should, points obliquely upward, and the posterior surface of the os calcis, instead of pointing backward, points slightly downward toward the ground, and the object of the operation is to lift the heel up in this position by anchoring the tendon into the bone so close to the insertion in the os calcis that it cannot stretch. It makes a strong ligament or guy rope of the tendon instead of a long elastic support which is easily overstretched.

Ordinarily in a normal foot with the patient lying in that position you can see the tendo achillis sticking up prominently under the skin, and when the foot is dorsiflexed the tendon becomes tense. In this case the posterior angle of the ankle looks flat, and when I lift the foot in dorsiflexion I cannot even feel the tendon under the skin with my finger.

OPERATION

The incision we use is a long one just to the outer border of the tendon, extending down to the insertion of the tendon in the os calcis. A constrictor is put on preceding all these tendon operations because it facilitates the work very much to have no bleeding. The only thing you have to avoid is the short saphenous vein which runs along up the inner border of the tendon and the saphenous nerve which accompanies it. They are very easily avoided.

rection of club-foot. You can get a hold on the foot in almost any position and use enormous leverage in twisting it in any direction. As a matter of fact, the more I treat club-foot, the less I use the wrench. We used it a great deal years ago, but very little now. Now, you see, the doctor has the tendon buried in the bone for about 2 inches. I am going to sew that flap of periosteum and bone right over the tendon so it will be buried in the bone.

Now I pass this stitch through the posterior capsule and the periosteum. Now we pass it through the tendon at a little lower level than the place where I want to sew it, and then come up through the periosteum and bone on the other side. This first stitch is simply to anchor the tendon down in the lower end of the groove that we made for it. We then put in another stitch on the other side and come out through the periosteum in the other direction. The lower end of the tendon where it goes into the canal has a bone-flap sewed right over it with the periosteum. We use kangaroo tendon and catgut for sewing the tendon and subcutaneous tissues, and black silk for the skin. If you ask me why I use silk for the skin, I do not know, except that I have been using it for three or four years. I stopped using silkworm-gut because it was so stiff it did not nicely approximate the edges, and started using silk, and have been using silk ever since. Now the tendon is buried and covered and we will take off the constrictor.

There will be a little oozing from the bone, but not enough to amount to much. Wherever you go through the cortex of the bone there is always some oozing for a few minutes, but we have not injured any blood-vessels of any size, and the bleeding is light and quickly stopped with a hot sponge pressed into the wound. The deep fascia is now sewed over the tendon and the muscles with a running stitch of small catgut. Then the skin incision is carefully and accurately closed with silk. After the gauze dressing is put on, the foot and leg up to the garter-line are enclosed in a plaster-of-Paris cast, with the foot plantar flexed and the heel lifted upward as much as possible to prevent tension on the tendon and periosteum.

In putting on the plaster cast there are several points to which I might call your attention which make for the comfort of the patient and the success of the operator. The skin should be covered with some snugly fitting cotton material, such as a white stocking or stockinet. The latter is this material (demonstrating), which looks like knitted shirting and is made in long tubes so we can cut off any length we want, and it comes in various widths for body, leg or arm. Never put absorbent cotton next to the skin when putting on a cast. It packs down into little wads with the perspiration and is lumpy and uncomfortable. Outside the stockinet we put two layers of sheet wadding. This is a material used by dressmakers for lining dresses, it has a little sizing and is slightly resilient. It comes in sheets which are cut up and made into long bandages by the nurse. Over the sheet wadding we lay a piece of felt wherever there is to be a good deal of pressure or where there are bony prominences. In this case we pad around the malleoli with felt and also put a piece on the dorsum of the foot and under the heel, because the foot must be pulled down while the heel is pushed up so that there may be no tension on the tendo achillis. Over the sheet wadding and the felt an ordinary roller bandage is put on very snugly and very smoothly, taking pains not to let the edge of the bandage or the reverses make wrinkles which will press into the skin. A cast may become unbearable within twenty four hours from the extreme pain caused by the constant pressure of a wrinkle in the stockinet or a fold in the bandage. In putting on the plaster bandages put them on smoothly, snugly and rub the plaster well into the meshes of the cloth as each turn is put around. That will make a light cast stronger than a heavy one which is not rubbed in. When putting a cast on the foot carry the plaster bandages up to the bases of the toes so as to cover the metatarsophalangeal joints. It is very much more comfortable than a cast which only comes up to the big toe joint. By turning back the ends of the stockinet over the ends of the cast and fastening them with a few turns of the last plaster bandage we give the cast a more finished appearance and prevent the unsightly protrusion of frayed and ragged edges of the padding which soon become

soiled. After three days a large fenestrum will be cut out over the incision so that the wound may be inspected and redressed. If there is no infection the second dressing will be left on until the stitches are taken out—about the ninth day. I shall try to show you this patient when the cast is taken off so you may see the result. When the final cast is taken off, in about two months, the patient will be allowed to begin to walk in a shoe which has an extra high heel so as to maintain the position of equinus and hold the heel up.

CLINIC OF DR VERNON C DAVID

PRESBYTERIAN HOSPITAL

LOCAL ANESTHESIA FOR HEMORRHOIDECTOMY

Summary Technic of infiltration extradural and paraspinal anesthesia—advantages and disadvantages of each method removal of hemorrhoids with the lamp and cautery—the after treatment results in 150 cases

THIS patient a man thirty two years of age has suffered from piles for the past four or five years. The remainder of the history of this case is not of special interest and the physical examination discloses nothing of importance other than several hemorrhoidal masses in the rectum. I shall confine myself to a discussion of local anesthesia for hemorrhoidectomy and shall demonstrate the method which has proved most desirable in my hands.

Heinrich Braun describes an *umspritzung* or infiltration anesthesia for rectal operations demanding more or less sphincter dilatation which is based on the principle of blocking the nerves just before they reach the rectum. This in my opinion is the method of choice. The patient is placed in lithotomy or Sims' position and with a fine needle four wheals are made in the skin about an inch from the anus (Fig 212 1). These wheals are connected subcutaneously using about 20 c c of a $\frac{1}{2}$ per cent novocain solution to which has been added 1 drop of adrenalin for each 10 c c of solution. A long needle 10 cm of medium bore is substituted and with the left index finger in the rectum hooked around the internal sphincter injections are made into or just outside the sphincters from each wheal in the skin (Fig 212 2). A circular area around the rectum is thus injected. To avoid causing pain in these deep injections it is necessary to have the anesthetic medium precede the needle-

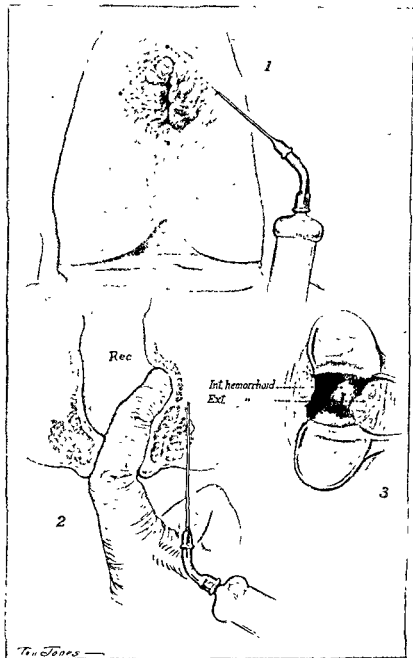


Fig 212

point to induce a pressure anesthesia for the minute. From each of these four wheals in the skin 10 to 15 c c of anesthetic is injected. In all 90 to 120 c c of $\frac{1}{2}$ per cent novocain adrenalin solution is used. The time consumed in this injection is fifteen to twenty minutes. It is best not to infiltrate the tissue to be removed and distort it but to inject outside of the operative area. Total anesthesia of the lower rectum is present in twenty minutes from the beginning of the injection and this anesthesia lasts for thirty to sixty minutes.

I believe that this type is the best local anesthetic for the work under consideration, because it always works the field of operation alone is anesthetized the technic is simple and there are no resultant complications.

After the injection of the last quadrant of the sphincter a rectal speculum is introduced and a careful dilatation of the sphincter muscles is made avoiding a sudden forcible dilatation which might tear their attachments (Fig 212 3). A thorough dilatation is one of the principal factors in the prevention of after pain especially in cases of long standing sphincter spasm with consequent hypertrophy.

Our operative procedure consists in removal of all hemorrhoids taking the most inaccessible first including skin tags below the hemorrhoids if any be present (Fig 213 4). A deep sulcus is cut in the skin to the mucocutaneous junction (Fig 213 5) and the hemorrhoid is removed by clamp and cautery so that the clamp-line and eschar are nearly in the same plane (Fig 213 6 7). The sulcus in the skin is closed by interrupted 00 catgut (Fig 213 8). A small gutta percha strip is left in the anus for twenty four hours. The after treatment consists of frequently applied warm boric applications with a tight bandage. Codein $\frac{1}{2}$ grain by mouth is given if necessary for the pain. Phenolphthalein and liquid petrolatum is used to insure easy bowel movements which are induced

Fig 212 — 1 Four cutaneous wheals connected by subcutaneous injection. 2 Finger hooked around internal sphincter as a guide. Anesthetic introduced into outer substance of sphincter muscles. 3 Gradual moderate dilatation of sphincter muscles.

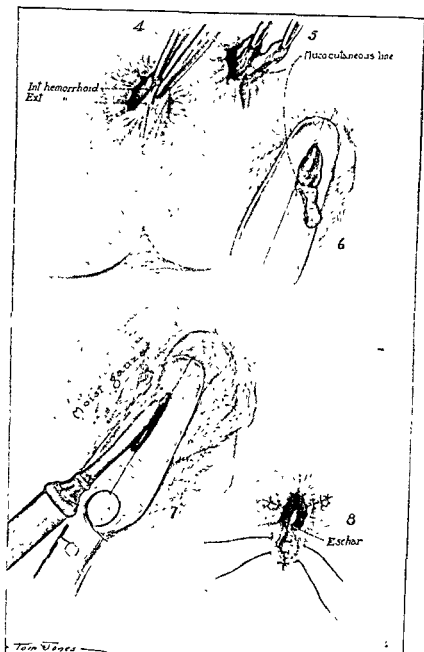


Fig 213

every twenty-four hours by the injection of 1 ounce of olive oil and 1 pint of warm water through a soft-rubber catheter.

In 150 cases which Dr. Frank E. David and I have operated on by this method the average amount of anesthetic used was 90 c.c. of $\frac{1}{2}$ per cent. novocain solution. The average stay in the hospital was five days after the operation, and over 90 per cent. of the patients were out of the hospital in less than a week. Pain during the administration of the anesthetic was limited to three or four needle pricks which were often unnoticed. Pain during the operation has been absent in most instances. The patients have been quiet, and many of them have dozed from the effects of a preliminary hypodermic of $\frac{1}{2}$ grain of morphin. One patient with cystitis had a strong desire to urinate, and 5 had uncomfortable pressure in the rectum during the dilatation of the sphincters. One other patient complained of pain over the sacrum. Omitting these complaints, the sphincters were dilated without discomfort. Pain after the operation usually consisted of burning and smarting for two to three hours. It was classed as slight in all but 18 cases, where it was of moderate severity, and 8 of these patients received codein, $\frac{1}{2}$ grain by mouth, and 3 others received two doses. Complications were practically absent. The skin edges were healed in ten days, as a rule, and suppuration in the wounds was minimal. *There have been no cases of secondary hemorrhage.* Only 2 patients were catheterized for inability to urinate following the operation.

The nerve supply of the anal portion of the rectum is from the pudic nerve, the pelvic branches of the posterior cutaneous femoral, the sacral and coccygeal plexuses, sympathetic nerves

Fig. 213 — *a* Internal hemorrhoid and skin tag below it picked up by forceps (dotted line represents area incised by scissors) *5* Sharp dissection of skin tag up to mucocutaneous junction above which is internal hemorrhoid *6* Skin tag, which has been dissected free, is held up and clamp is applied under it to the internal hemorrhoid. Then the internal hemorrhoid and skin tag are cut off with scissors about 0.5 cm. above the clamp *7*. Cauterization of internal hemorrhoid close to clamp *8*. Interrupted catgut suture of defect from removal of skin tags. It must be noted that the sutures are not placed in the oval circumference so as to constrict it, but simply to restore it to normal proportions.

manner Altogether, 100 c.c. of a 1 per cent novocain solution is used. During the injection a finger in the rectum may be used to act as a guide for the insertion of the needle. After a wait of twenty minutes the bladder, prostrate, genitals, and sphincter ani, as well as the skin along the back of the thigh, are anesthetic.

The objections to the method are concerned with the large amount of the anesthetic which is necessary, and the unnecessary extent of the anesthesia produced if it is used for rectal operations only

My experience leads me to the conclusion that infiltration anesthesia with novocain offers a safe and technically simple method for hemorrhoidectomy or other minor operations on the rectum requiring sphincter dilatation.

An operative procedure, including moderate sphincter dilatation, sharp dissection and suture of cutaneous piles, clamp and cautery of hemorrhoids covered with mucous membrane and no rectal plug, gives a good result with minimum tediousness of convalescence.

CLINIC OF DR DALLAS B. PHEMISTER

PRESBYTERIAN HOSPITAL

RECONSTRUCTION OF THE HEPATIC DUCT

Summary A portion of the hepatic duct included in the ligature for the cystic artery during cholecystectomy with resultant complete stasis of bile and destruction of the portion of duct involved, repair by T tube and omental graft, dangers of cholecystectomy—the control of hemorrhage—causes and results of leakage of bile from cystic duct—frequency of injury to hepatic and common ducts, how the accident occurs, methods of repair

THIS case illustrates one of the serious complications which occasionally arise from the operation of cholecystectomy.

Mrs M, age forty-eight, was admitted to service of Dr. B. W. Sippy, Washington Boulevard Hospital, June 23, 1916, with the following history

The patient had always been fairly well up to four years ago, since which time she has had about ten attacks of pain in the epigastrium, radiating to the back and right shoulder, severe in character, usually accompanied by vomiting and requiring morphin for relief. The attacks last from one to four hours. The last attack, which was the worst one, occurred one month ago and was followed by soreness and tenderness in the upper abdomen for several days. Never any high fever or jaundice. Between attacks, and particularly during the past five months, the patient has had a great deal of epigastric distress, especially of evenings. Frequently takes soda, which usually gives relief. Has lost 20 pounds in weight during the past six months.

Examination shows a poorly nourished woman, weight 115 pounds, no jaundice. Regional findings negative except for abdomen, which shows tenderness in epigastrium and beneath right costal margin. No tumor mass palpable.

Subsequent observation and study showed absence of evidences of a gastro-intestinal lesion

Diagnosis.—Cholelithiasis.

Operation, July 6, 1916 Oblique gall-bladder incision extending from the xiphoid downward and to the right to level of umbilicus. Adhesions of omentum and duodenum to a thickened and somewhat contracted gall-bladder, containing several stones and a small quantity of bile. After freeing the adhesions, cholecystectomy was performed, beginning at the cystic duct. The pedicle of the gall-bladder was cut between two clamps. The distal clamp did not include the cystic artery and a sharp hemorrhage resulted. After a little difficulty the bleeding point was clamped and ligated. It was noted at the time that considerable tissue was included in the pedicle, but the bile-ducts were not identified in the mass. The gall-bladder was then removed and the wound closed, with a cigarette-drain left in place. There was more reaction following the operation than is usual, and on the second morning the patient was jaundiced. The jaundice increased rapidly until, on the fifth day, it was very marked and the urine was loaded with bile. The bowel movements became light and watery. The patient became somewhat drowsy and continued to vomit occasionally. Pulse, 72 to 84; temperature, 99° to 100° F. Little drainage and no bile from the drainage-tube.

An obstruction of the bile passage, probably due to the ligature, was diagnosed

Operation, October 11, 1916. Wound opened. Pedicle of gall-bladder isolated and ligature cut. After its removal it was found that the hepatic duct had been caught in the forceps with the retracted cystic artery, as indicated in Fig. 216, and that a knuckle was included in the ligature. It was difficult to determine the amount of damage to the duct, but from fear of leakage it was opened and a catheter introduced. Following the operation all of the bile came through the tube, the jaundice disappeared, and the stools became clay colored. The tube was removed on the twentieth day, but all of the bile continued to come through the wound. Up to the 15th of August no bile

had appeared in the stools. The patient felt well and had gained some in weight and strength. It was decided that the ligated portion of the duct had sloughed and that its continuity, therefore, had been interrupted.

Operation, August 16, 1916, for repair of the hepatic duct. Upon opening the abdomen extensive adhesions were found. A probe was introduced to the bottom of the fistula and the duodenum and stomach dissected from the under surface of the liver, exposing the duct at the seat of injury. The proximal end of the duct was easily identified by the escaping bile, and the end of the distal portion was found by tracing the necrotic bridge which represented all that was left of the constricted portion (Fig 216, 1). A probe was introduced through the duct to the ampulla of Vater. Before the operation I spent considerable time figuring out a method for repairing the defect. It was decided if possible to pass a catheter through the distal portion 6 or 8 inches into the duodenum, then, after turning back a cuff on the other end, to introduce it into the proximal portion, suturing the divided ends of the duct as well as possible about the catheter. Dr L L McArthur told me that he had used this method successfully in 3 cases, the tubes working out into the bowel in from six to ten weeks. It was impossible to pass a catheter through the ampulla into the duodenum despite the fact that it was armed with a silver wire. I was not surprised at this difficulty, as I had previously tried it without success on 4 fresh cadavers.

The duct was finally repaired with a T-drain, making the two arms that were introduced into the ends of the duct about $1\frac{1}{4}$ inches long (Fig 216, 2, 3). The divided portions of the duct were so adherent that they could not be brought together about the tube, leaving a bridge of about $\frac{1}{2}$ inch which was covered over by a loop of omentum carefully tamponed about it and held in position by catgut sutures (Fig 216, 4). Bile came freely through the tube to the outside, and the first stool on the fourth day was clay colored and gave a negative test for bile. However, the test on the next stool was positive. On the eighth day the outside tube was tied off and all of the bile

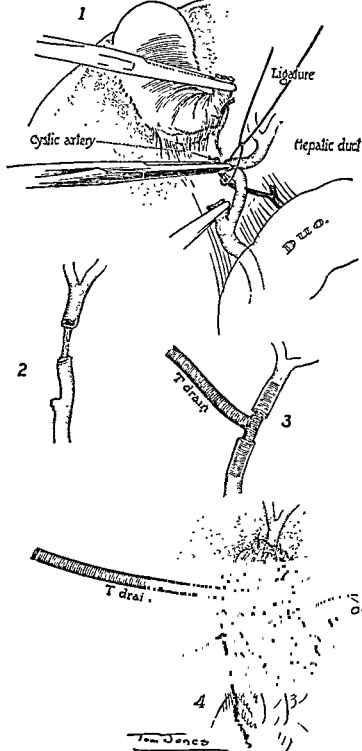


Fig. 216.

went into the intestine. The tube was left in position for eighty-four days, during which time there was never any leakage about it. The patient gained rapidly in strength and weight and became free from symptoms.

November 8, 1916, under gas anesthesia, the tube was pulled out. There was some leakage of bile for eight or ten hours, when it closed and has remained closed since.

The patient continued well until two weeks ago—January 15, 1917—when, while suffering from the grip, she had some abdominal pain, a chill, and temperature of 104° F. These symptoms rapidly disappeared, but were followed by slight jaundice and bile in urine, which have now disappeared. It is too soon to judge of the significance of this occurrence, but it may mean that a stricture is developing at the seat of the repair. I will report subsequently upon the outcome.

The main reason for preferring cholecystostomy to cholecystectomy is the greater difficulty and risk encountered in performing the latter operation. If it were as easy for the surgeon and as safe for the patient no doubt nearly all calculous gall-bladders would be excised, as re-formation of stone is prevented and an infected organ which may not be rendered healthy by simple drainage is removed. The important dangers from cholecystectomy are hemorrhage, leakage of bile from the cut end of the cystic duct, and injury of the common or hepatic ducts. Hemorrhage usually comes from the cut cystic artery, and in case the exposure is poor it may be extremely difficult to control. Considerable bleeding may occur from the gall-bladder, but this is more accessible, and since it is chiefly a venous oozing can be stopped by a gauze-pack in case the bleeding points cannot be tied off. Rarely the right branch of the hepatic artery is injured, and instances are reported where it has been tied off without subsequent clinical evidence of injury to the liver.

Fig 216—1 Hepatic duct accidentally included in the bite of the forceps—and later in the ligature—which caught the retracted, bleeding cystic artery. 2 Remnants of necrotic segment found at last operation. 3 T-tube in place. Because of adhesions, the ends of the duct could not be brought together about the tube. 4 Omentum sutured about the defect.

Early leakage of bile from the stump of the cystic duct comes either from failure to include it in the ligature of the pedicle, which sometimes results when the artery forceps slips and the stump has to be caught again, or from injury to the duct by the artery forceps, particularly when it is forcibly pulled upon during ligation. I have seen an instance of each during the past year. It results in a profuse discharge of bile from the drainage-tube within a few hours. The intestines and omentum rapidly wall off the general peritoneal cavity and a biliary ascites usually does not form, but bile goes into the space between the under surface of the diaphragm and the liver, as it is much more difficult to wall off. In one instance there was very severe pain in the right chest, neck, and abdomen, and a temperature of 101° F. for two or three days resembling a diaphragmatic pleurisy. This was the result of a mild infection of the biliary accumulation. Fortunately, this early leakage of bile is rarely dangerous, as the bile is usually sterile or nearly so and peritonitis very rarely results. I have had one death from infection of such a subphrenic accumulation of bile which leaked out alongside a drain placed in the common duct. The patient was seventy-six years old and deeply jaundiced from a common duct stone at the time of operation. At autopsy ten days later bile was found in the general peritoneal cavity and only a moderate amount about the gall-bladder region. The right subphrenic space contained about 1 quart of bile mixed with pus, and there was extensive fibrinous exudation on its walls. Early leakage of bile from infected ducts is, of course, much more dangerous. The leakage which occurs not infrequently from sloughing of the ligated stump of the cystic duct two or three to fifteen days after operation is of little danger because the tract is well walled off by that time.

Injury of the hepatic or common duct is no doubt much commoner than is realized. Kehr states that in his first 1000 cholecystectomies there are records of injury of the hepatic duct in one form or another in 16 cases. Because of the meager reports in the literature he inquires if it be possible that he is the only offender. When the removal of the gall-bladder is

begun at the fundus, as was Kehr's practice, the injury to the hepatic duct results from cutting during isolation of the pedicle or from clamping and cutting beyond the drawn-up junction of the cystic and hepatic ducts.

Injury of these ducts should occur less often when the cholecystectomy is begun at the cystic duct, as the pedicle can be isolated and the vessels clamped, thereby avoiding the bleeding which obscures the field of operation. When the cystic artery is not properly caught or takes an aberrant course the likelihood of injury in controlling the hemorrhage still exists, as in my case. However, I find no instance in the literature where the duct was injured by this particular method of inclusion of a knuckle in the ligature with subsequent sloughing. In the reported cases the common duct has been injured oftener than the hepatic. In case the injury leads to a persistent biliary fistula various operative procedures are employed for its correction to meet the exigencies of the case. They are extensively reviewed by Kausch¹ and recently by Ginsburg and Speese.² The latter attempted the repair of the duct by the use of a T-tube without the surrounding covering of omentum, but there was sloughing and leakage about the end in the duodenal portion. The T-tube was removed and the duct repaired by the use of a fascial transplant over a rubber tube, which was still *in situ* at the time of the report four months after the operation. I believe that the method here employed will be the one of choice where a tube cannot be passed into the duodenum and the duct ends sutured over it. End-to-end anastomosis without a tube has been used where the repair has been made immediately following the injury, but it is difficult to perform and will nearly always be found impossible in secondary operations because of the adhesions that have formed. Lewis and Davis successfully repaired severed common ducts in dogs by use of free transplants, but these had a tendency to stricture formation. The same objection can be made to the omentum as used in this case. That a considerable length of the duct can be suc-

¹ Archives für Klin. Chir., vol. xcvi, p. 249.

² Annals of Surgery, vol. lrv, p. 65.

cessfully replaced by omentum is illustrated by a case in which Brewer could not find the distal end, and used a rubber tube surrounded by a canal of omentum to connect the proximal end with an opening in the anterior surface of the duodenum. The tube was subsequently passed and the patient was well one year after operation.

Anastomosis of the proximal end of the duct with the duodenum, which has proved successful in a few cases, would have been a technical impossibility in my case, because the end of the duct was retracted and buried in a mass of adhesions. A new duct has been made from a flap of duodenum or a loop of jejunum after the method of Kausch. These methods have been little used, and it is questionable if better results will be obtained from them than from the employment of omentum or fascia.

CLINIC OF DR CARL B. DAVIS

PRESBYTERIAN HOSPITAL

A CASE OF PANCREATIC ABSCESS: RESULT ONE YEAR AFTER OPERATION

Summary History suggestive of gall tract disease, but differing from the classical picture sufficiently to preclude a positive diagnosis, discovery and drainage of abscess of the pancreas at operation, digestion of tissues about the incision by the discharge and resultant ventral hernia, differentiation from acute metastatic pancreatitis, probability that a perforated duodenal ulcer was the source of the infection

THIS patient, a physician forty-five years of age, entered the hospital about one year ago because of a gradually increasing distress in the upper abdomen. One month before admission there was observed a vague discomfort after meals, accompanied by an irregular tympany. Cathartics and enemata had but little influence on his condition. Pain gradually developed in two regions, first on the right side, in the location of the gall-bladder, and, second, beneath the left costal arch. The pain was more severe after meals. The pain was referred occasionally to the right lumbar region, but never to the scapula. The pain was not a severe cutting colic, but rather a dull, grinding ache. The patient in describing it said it felt as though he were filled with rolling rough stones. Morphine was required finally to control the pain.

There was no nausea or vomiting during the illness. The stools were clay colored for a time and then returned to normal. The feces were examined for gall-stones, but none were found. On one occasion previous to admission to the hospital several whitish stones were passed, but no analysis of them was made and their origin was not determined. The previous health had

been good—no similar attacks before. Typhoid fever eighteen years ago. No venereal history.

Examination showed a well-developed, muscular man. There was no jaundice. Eyes reacted normally to light and accommodation. The pupils were equal. Mouth, throat, and neck were negative. The lungs and heart were normal. The abdomen was normal in appearance, slightly rotund. Palpation showed marked tenderness and moderate rigidity over the gall-bladder region. There was a point of lesser sensitiveness under the left costal arch. The liver margin was palpable. Beneath the liver margin was an area of resistance with no definite outline. The spleen was not palpable. There was no ascites. The lower abdomen was normal. The genitalia and extremities were negative. There was no lymphadenopathy. The reflexes were normal throughout. The temperature was normal each morning, with an evening rise to 101° F. Pulse was about 100 and respirations 24. Stomach analyses were negative. Feces normal in color, urobilin present. Weber negative. No mucus, pus, or undigested food particles. There is no record of examination for starch or fat. The urine was normal. A twenty-four-hour specimen showed 2000 c.c. Blood examination: erythrocytes, 4,680,000; leukocytes, 28,000; hemoglobin, 70 per cent.; Wasserman reaction negative.

On the basis of the transient occurrence of clay-colored stools and the passage of stones per rectum; of the location of the maximum pain in the right hypochondrium and the marked tenderness and moderate muscular rigidity in the same region; of high leukocyte count and the septic temperature, a probable diagnosis of empyema of the gall-bladder was made and operation advised.

On opening the abdomen under a general anesthetic the gall-bladder and passages were found normal. A finger in the foramen of Winslow came in contact with a firm, rounded mass in the pancreas. Beneath the transverse colon a mass was seen bulging downward and forward against the transverse mesocolon. This protrusion was ruptured and 6 to 8 ounces of pus escaped as the finger passed into the body of the pancreas. A

cigarette-drain and a soft-rubber tube were passed into the mass, the peritoneal rent was closed as thoroughly as possible, and the omentum was packed and sutured against the opening and along the course of the tubes. The dressings were changed at frequent intervals, but there developed nevertheless a rather marked destruction of the abdominal wall. Two weeks after operation the discharge ceased and the tubes were withdrawn. The patient eventually left the hospital with a ventral hernia.

The source of the pancreatic infection is not clear. An acute metastatic pancreatitis passing into a suppurating condition would have a different clinical picture. There should have been more acute colic earlier in the history, associated, as a rule, with nausea and vomiting. The possibility of a gastric or duodenal ulcer perforating upon the pancreas must be considered. The patient had been a hearty eater, and up to one month before entering the hospital there had been no distress associated with the taking of food. Of course this does not rule out the possibility of ulcer, because the literature is full of cases reporting perforated duodenal ulcer with no previous symptoms. Of gastric or duodenal ulcer, it seems that the latter is more probable because, as the finger entered the lesser peritoneal cavity through the foramen of Winslow, there was no break in the peritoneal lining of the bursa, the cavity was empty, and the abscess of the pancreas was confined by the posterior layer of the peritoneum. The stomach showed no induration, and there was no adhesion of the stomach to the pancreas. The clay-colored stools were due probably to a temporary closure of the bile-duct by pancreatic pressure. The passing of the light-colored stones might suggest a blocking of the pancreatic ducts by calculi, with a gradual onset of suppuration, but the rapid convalescence following operation does not support such a contention.

With the opening of the abscess cavity we were fearful of the occurrence of fat necrosis and pancreatitis. Fortunately there was no leakage into the peritoneal cavity. There was considerable digestion of the abdominal wall by the escaping pancreatic juice with the discharge of necrotic connective tissue,

but the wound healed readily after the removal of the drainage-tubes.

One year after operation we find this patient at work and in good health, his only complaint being the ventral hernia, for which we have to blame the digestive juices which found their way to the surface by way of the drainage tract.

CLINIC OF DR. N. M. PERCY

AUGUSTANA HOSPITAL

RESECTION OF STOMACH FOR CARCINOMA

Summary History and physical examination of the patient, late appearance of symptoms in carcinoma of the stomach, relationship between gastric ulcer and cancer, gastro-enterostomy in ulcer as a prophylactic against cancer, importance of an early diagnosis, exploratory laparotomy demanded in every case of suspected carcinoma of stomach, technic of resection of the stomach, postoperative treatment, prognosis relatively favorable as to immediate results, symptoms of recurrence probable within two years

THE patient, a male aged fifty-eight years, was admitted to the service of Dr Percy, February 2, 1917, because of pains in the stomach and some loss of weight

His family history is negative to carcinoma and tuberculosis For many years he has had occasional spells of belching, but this is the only symptom he has had referable to his stomach He had influenza one year ago which was complicated by an infection of the left frontal sinus

Eight weeks ago he felt some slight rolling pains beneath the left costal margin He was examined carefully and no trouble found Seven weeks ago these pains became more annoying and have continued to the present time They are not severe, have no relation to the taking of food, and for the past two weeks have been present constantly night and day They are not severe enough to keep him awake, but when he awakens he notes that the pains are still present Sometimes the pains run down into the abdomen and then back up into the stomach region Three weeks ago, after eating an orange, he felt nauseated and vomited once Vomited again after an ordinary supper a week ago He vomited only a small amount each time and no blood. Stools have always been costive, but there has never been any evidence of blood in them.

He has been on a liquid diet for the past three weeks, but has done this because the x-ray plates taken three weeks ago showed a small outlet in the stomach and he is afraid that if he eats coarse things this opening will become plugged. His appetite is good, however, and he has partaken freely of a general liquid diet with no distress after eating. His only weight loss is 8 pounds, which has taken place since being on a liquid diet.

Examination.—The patient is a poorly nourished man with a slightly sallow complexion, but who does not appear fifty-eight years old. Head, eyes, nose, and mouth are negative. There are some small palpable posterior cervical glands, but no axillary or supraclavicular glands. There are no areas of dulness in the lungs, but occasional scattered mucous râles are heard over the left upper lobe. Heart is negative. The stomach is much distended and distinct peristaltic waves are visible. The greater curvature is 2 inches below the umbilicus. Distinct waves come up to a palpable mass $2\frac{1}{2}$ inches to the right of the midline and 2 inches below the costal margin. This mass is $2\frac{1}{2}$ inches across and extends to the right and then downward. It is hard and quite movable, but not tender. The right external inguinal ring admits one finger and the internal ring the finger-tip. Rectal examination shows the prostate slightly enlarged, smooth, and firm. No nodules are palpable in or about the rectal wall. Knee-jerks are present.

x-Ray examination shows the stomach enlarged. Peristalsis normal. At the pylorus there is a large filling defect involving nearly the entire pyloric end of the stomach. The pyloric opening is at the upper portion and is apparently about the size of a No. 10 catheter. The duodenal cap is not demonstrable.

Comments.—DR PERCY (February 3, 1917): You notice in the history of this case the absence of any and all symptoms until eight weeks ago. With the exception of some rumbling in his stomach he has had his usual normal health with no loss of weight until three weeks ago. Up to the present time there has been no pain in relation to taking of food, his only distress being that described as a rolling sensation in the stomach. You notice he said the rolling sensation first appeared about

eight weeks ago. While it is unusual to meet with a case with such absolute freedom from gastric symptoms, still there are many cases of cancer of the stomach which do not produce many definite symptoms until the obstructive signs develop, and, unfortunately, the obstructive signs often do not come on until very late, when the diagnosis has little value.

The relationship between gastric ulcer and gastric cancer is still an unsettled question. The frequency with which gastric cancer develops from a previous benign ulcer has been variously estimated by different observers, the percentage ranging from 3 to 100 per cent. While it may be difficult to demonstrate that a proved case of cancer of the stomach had ever existed as a benign ulcer, there is much clinical evidence to support such a theory. Smithies, in reviewing a large series of pathologically proved cases of cancer of the stomach, found that over 65 per cent. of these cases had a long dyspeptic period of the ulcer type preceding any symptoms which could clinically be interpreted as malignant. The average duration of the clinically non-malignant dyspeptic period of "ulcer type" in this 65 per cent., comprising over 600 cases, later evidencing malignancy, was 10.8 years.

From our experience it would seem that if a careful history is always taken, especially if this is done by the surgeon himself, an even larger percentage of cancer cases will give clinical evidence of the existence of a benign ulcer preceding the malignant growth.

In all cases presenting a clinical history of chronic gastric ulcer the possibility of such ulcer becoming malignant should always be borne in mind. In such cases if relief is not obtained in a reasonable time after careful medical management, surgery should be resorted to, if for no other reason than to lessen the likelihood of the ulcer becoming malignant. The operative procedure in chronic callous ulcers of the stomach is preferably excision of the ulcer or pylorotomy. If such a procedure does not seem wise, then a gastro-enterostomy should be performed, as it has been shown by various observers that malignancy seldom supervenes after gastro-enterostomy. This is

probably due to the fact that not only are the mechanics of the stomach changed, but after a gastro-enterostomy the physiology of the stomach is also altered in many ways.

Carcinoma of the stomach is very common. It constitutes practically one-third of all carcinomata of the body. The carcinoma in this case is located in the pyloric end of the stomach, where, fortunately, about 70 per cent. of them are found. I say fortunately, because when in this location the diagnosis is more likely to be made at an early date, and on account of the obstructive symptoms the patients come into the hands of the surgeon at a time when there is a chance of obtaining relief. Furthermore, when the growth is in the pyloric end of the stomach a radical excision is accomplished with greater ease and less risk than when in the cardiac portion.

The most important point in connection with carcinoma of the stomach is an early diagnosis. We look upon cancer of the stomach as being as much a surgical condition as cancer in any other portion of the body. The prognosis in cancer of the stomach compares very favorably with that of cancer of the breast. While every physician advises operation in cases of carcinoma of the breast, there are many physicians who are not very prone to recommend operation to their patients with cancer of the stomach. I think we can promise about as many five-year cures in carcinoma of the stomach if the radical excision is done early as we can in cancer of the breast. Of course the immediate mortality from a resection of the stomach is somewhat higher than that following an excision of the breast, but still, as far as the ultimate results are concerned, they compare very favorably with each other. In every case in which carcinoma of the stomach is suspected an exploratory laparotomy should be made because, just as with cancer in other portions of the body, it is the early cases that offer the most favorable prognosis. When a cancer of the stomach can be definitely diagnosed clinically the hope of a radical cure is not great.

Now, notwithstanding the fact that an x-ray examination after the bismuth meal indicated that the pylorus is almost completely obstructed, this patient has had very little vomiting.

I think he has vomited only twice during his illness. Also it is rather peculiar with this amount of obstruction that this man has no stasis. His stomach empties itself, but does that on account of the hyperperistalsis. You note in the history that the food passes out of the stomach in a reasonable time. This patient has lost only 8 pounds in weight. The tumor here is very easily palpable and quite movable. I think you can all see this mass from the benches, still we look upon this case as very favorable for operation.

A distinctly palpable tumor is not at all a contraindication to operate, even though it be a large mass. Some of the cases with the largest palpable tumors are the most favorable cases for operation, while, on the other hand, some of the cases with only small tumors of the stomach may involve the pancreas and of course, be inoperable. We have found however, that involvement of the lymph glands is not necessarily a contraindication to the operation. The lymph glands, especially in the lesser curvature of the stomach, are usually involved, but they can be taken out at the time of operation just the same as we take out the axillary glands in carcinoma of the breast. Even when the carcinoma is adherent to the pancreas, but the pancreas itself is not distinctly involved, the case may still be operable. In such cases one can take away the tumor without any apparent harm to the pancreas, so as time goes on we are operating more and more of these cases and find that our results justify the procedure.

So far in this case we have not been able to demonstrate metastases anywhere, and we hope when we expose the abdominal cavity that we will not find metastases in the liver. If we do, then we will do only the palliative operation of gastroenterostomy. Just at the present time we seldom do the two stage operation in carcinoma of the stomach. I think, however, there are a few cases where it is advisable. On the other hand I think the majority of cases do better if the operation is all done at one time. In cases with fairly good health the mortality in the two stage operation is not much different from the mortality in the one stage operation.



Operation —We will make a midline incision here (Fig 217, 1), because we expect to remove at least three fourths of the stomach, which will take us far over to the left side. I will make the incision from the ensiform cartilage to the umbilicus keeping in the midline and splitting the linea alba. By so doing we will have practically no bleeding. We split the linea alba and pick up the peritoneum. Now you can all see the large tumor which was felt before operation (Fig 217, 2). The tumor is in the pyloric end of the stomach, about 3 inches in length and 2 inches in width. From palpation it would seem that the pylorus is almost completely obstructed. We will now examine the other abdominal organs, especially the liver. I find no enlarged glands under neath the liver nor any masses in the liver. We will examine the pelvis for metastases, there are none. Now I am feeling the prostate. The gland is a little enlarged and somewhat nodular. Now I am palpating the appendix region. I find the appendix slightly adherent, but otherwise negative. The gall bladder is large with a defect at the upper portion, making somewhat of a goose neck appearance. I find no stones in the gall bladder nor in the cystic duct. You will note in the mesentery of the colon a very small lymphatic gland. However, it does not feel like carcinoma. Enlarged lymphatic glands in these cases do not necessarily mean carcinoma, but are very apt to be inflammatory. Along the lesser curvature of the stomach we find some larger glands. Here is one quite hard, which, in all probability is a carcinomatous gland. That, however, is not a contraindication to operation, as we will remove all the glands in the lesser omentum. The splenic area is negative. The fundus of the stomach is negative. You will notice that the stomach is greatly distended with gas.

We will make our resection by first cutting off the duodenum. With a pair of forceps I tease a way beneath the duodenum through the lesser omentum (Fig 217, 2). I have now worked my way along the duodenum 2 cm. and will grasp it with a pair of crushing forceps. You see I am staying about 1½ inches distal

Fig 217 —1, Site and extent of incision. 2, 3 and 4 method of mobilizing stomach on duodenal side of tumor.



Tom Jones →

to the carcinoma which is right at the pylorus (Fig 217, 3) Now we will place two pairs of Ochsner forceps on the stomach side and sever the duodenum between the forceps (Fig 217, 3, 4) We will clamp and ligate the gastrocolic omentum, dividing the gastro epiploic artery at this point Now we work along the greater curvature of the stomach, clamping with two pairs of forceps and cutting between being careful to avoid the colic artery Now we will ligate the vessels in the gastrocolic omentum before going any further (Fig 218, 5) All the vessels in the gastrocolic omentum having been ligated, we replace the transverse colon in the abdominal cavity Now we come over to the lesser omentum and take this off rather high and close to the liver, removing the greater portion of the lesser omentum, together with all the lymphatic glands (Fig 218, 6) At this point the pylorus is grasped and cut and ligated The dissection is now carried along as far as the point where the gastric artery comes on to the stomach (Fig 219, 10, B) I cannot feel any glands beyond the point where I have ligated the lesser omentum As we attempt to raise up the pyloric end of the stomach the pancreas is found to be strongly adherent to the tumor, and also a loop of jejunum is adherent at this junction of the adhesion of the tumor and pancreas I will first cut the jejunum from the tumor, leaving the peritoneal portion of the jejunum attached to the growth, and then sew over the defect of the intestine thus caused with a few Lembert silk sutures In separating the tumor from the pancreas it is necessary to trim away a small portion of the pancreas with the growth The resulting defect in the pancreas will be covered over by the stump of the ligated gastrocolic omentum The tumor is now free from the pancreas The gastrocolic and lesser omentum having been ligated, a large crushing clamp is placed across the stomach at the level of the point where the gastric artery comes on to the stomach Another clamp is placed on the stomach just distal to the crushing clamp

Fig 218—5 6 Freeing greater and lesser curvature from omental attachments Hemorrhage controlled by means of clamps and ligatures 7 8 9 method of handling duodenal stump by ligation in groove left by crushing clamp and invagination with purse-string suture

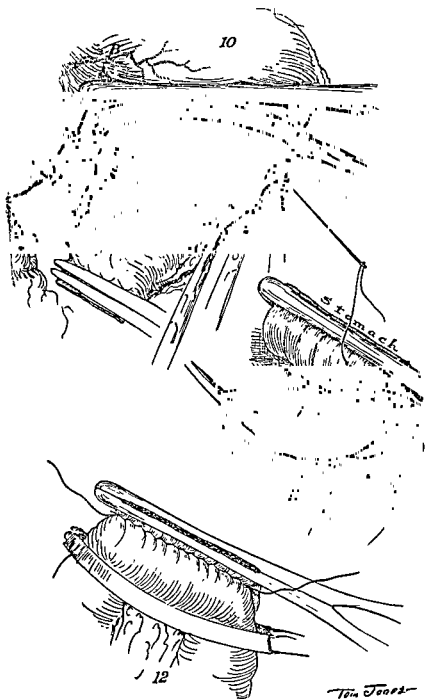
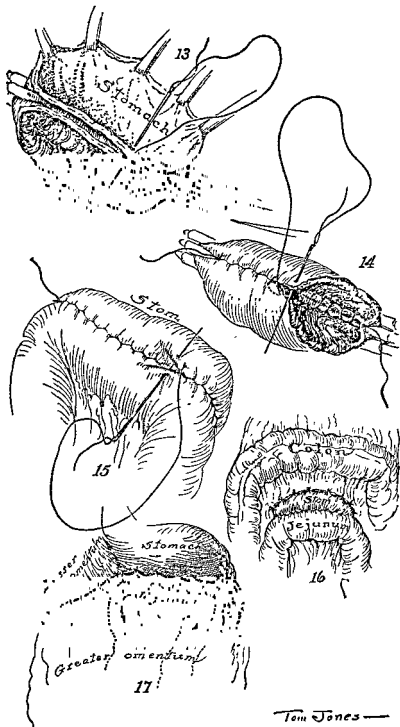


Fig. 219.

to prevent leakage from the resected portion of the stomach, and the stomach is severed just distal to the crushing clamp. This removes the tumor, pylorus, about three-fourths of the stomach, together with the lymphatic glands in the lesser omentum and the gastrocolic omentum. The open end of the duodenum is now disposed of by placing four mouse-toothed forceps on the end of the duodenum, then removing the crushing clamp and ligating with catgut in the groove made by the clamp (Fig 218, 7, 8). This ligature controls the hemorrhage from the duodenum. A purse-string of silk is placed in the head of the duodenum and the ligated end of the duodenum inverted, just as one inverts the stump of the appendix (Fig 218, 9). Three or four interrupted Lembert silk sutures are placed in the end of the duodenum to make sure that there can be no leak.

Having disposed of the duodenum, our next step will be to re-establish the continuity of the stomach and intestine. Recently, instead of closing the open portion of the stomach and making a gastro-enterostomy, we have been anastomosing the jejunum directly to the open end of the stomach. That is what we will do in this case. The transverse colon is held up, making its mesentery taut, and an area comparatively free from blood-vessels is selected and a large hole torn in the mesentery. A loop of jejunum is pulled up through this opening in the mesentery of the colon, after which the colon is returned to the abdominal cavity, thus avoiding any unnecessary exposure of the intestine. The portion of the jejunum for the anastomosis is selected as high as possible without having any tension on its proximal portion after the anastomosis is completed. With the crushing clamp still on the stomach, the jejunum is attached along the posterior edge of the stomach by means of a running Lembert silk suture (Fig 219, 11, 12). A Roosevelt clamp is now placed, grasping the end of the stomach and the jejunum, the crushing clamp is removed, and several mouse-toothed forceps applied to

Fig 219—10, Tumor bearing tissues isolated. Their ablation will be completed by an incision which will be carried through the stomach between the two uppermost clamps. 11, 12, The first (posterior) row of stitches which approximate the serous surfaces of stomach and jejunum.



Tom Jones —

the edge of the anterior wall of the stomach (Fig 220, 13) The jejunum is opened making the incision parallel to and about $\frac{1}{4}$ inch from the Lembert suture line to the posterior wall of the stomach A second row of continuous sutures, using chromic catgut, is placed passing through all the coats of the stomach and jejunum (Fig 220 13), placing the sutures close enough together to be certain that all the hemorrhage is controlled After completing this second row of sutures posteriorly it is changed from an over and over stitch to a running Connell suture and continued around anteriorly, uniting the anterior edge of the stomach with the jejunum This suture controls the bleeding and at the same time folds in the edge of the *mucous membrane of the stomach and intestine* (Fig 220 14) The anastomosis clamp is now removed from the stomach and jejunum and a Lembert silk suture (Fig 220 15) is carried around anteriorly thus completing the anastomosis The transverse colon is now brought up and the anastomosis pulled down through the opening in the transverse colon and the edges of this opening carefully sutured to the stomach wall about $\frac{1}{2}$ inch from the anastomosis suture line (Fig 220 16)

Drainage—Ordinarily, following resection of the stomach it is our custom to close the abdomen without drainage In this patient on account of damage done to the pancreas by cutting the tumor away from this organ a cigarette drain will be placed down to the head of the pancreas and brought out through a stab wound If there is any leak of pancreatic fluid it will be taken care of by the drain

Postoperative Treatment—The patient will be placed in bed in a semisitting posture which will favor immediate drainage

Fig 220 —13 Beginning the through and through hemostatic stitch which is carried as such the entire length of the posterior half of the incision but is changed to a Connell in-out and-over stitch (14) when the anterior half of the incision is reached 15 completing the closure of the anastomosis by means of a continuous Lembert stitch 16 edge of hole in the omentum has been stitched to the stomach about 1 cm proximal to the line of anastomosis Note the colon drawn upward 17 Colon has been dropped back into place and the space left by the removal of the tumor has been obliterated by stitching the edge of the incision in the greater omentum to the stomach and to the lesser omentum

from the stomach. Normal salt solution will be administered per rectum by the Murphy drop method, giving 500 c. c. every four to six hours. Sips of water will be given by mouth this afternoon if there is no nausea. If there is any vomiting, a gastric lavage will be given and repeated as often as is necessary. It is seldom necessary, however, to use gastric lavage, as there is usually no vomiting and very little nausea. It is our experience that following a partial gastrectomy the patients have less nausea and vomiting than the average abdominal case. Beginning the third morning after operation a daily S. S. enema is given, but no food until the fourth day, when liquids in small quantities are allowed. The salt solution per rectum is discontinued on the third day. A cathartic will be administered on the tenth day, after which a soft diet will be allowed. The patient will be kept in bed a period of two weeks.

Prognosis.—The mortality in a case of this type is about 10 per cent. The chances of an ultimate cure are slight. In all probability, I would say that this patient will do well for one and a half or two years and then have a recurrence of the disease. Occasionally a case of this type remains well for several years.

CLINIC OF DR JAMES T. CASE

ST. LUKE'S HOSPITAL

COMPARISON OF THE OPERATIVE AND RADIOTHERAPEUTIC TREATMENT OF UTERINE MYOMAS

Summary Essential similarity of the penetrating and therapeutic properties of the hard roentgen rays and the gamma rays of radium, radiotherapy successful in a certain class of uterine fibroids, mortality and morbidity due to operative treatment as contrasted with that following radiotherapy, conclusions—operation recommended in all but cases of uncomplicated fibroids, rapidly growing tumors, pregnancy, serious disease of the adnexa and failure to obtain complete preliminary curetage with microscopic examination of the curetage, contraindicate x ray or radium treatment

It is within the memory of many practising physicians that the treatment of fibroids by means of electrical currents aroused a lively hope that this non-operative method would make it unnecessary to send a patient to the surgical ward for relief from uterine fibroids, but after a very brief existence this hope had to be abandoned

Again a new non-surgical treatment for uterine fibroids has arisen in the application of roentgen rays and radium, and the practicability of this method seems to be established beyond question in a certain class of cases. The testimony of numerous authors, including such men as Bordier, Albers-Schoenberg, Fraenkel, Pfahler, Schmidt, Béchère, Kroenig, Gauss, Krause, Lange, Abbe, Kelly, and Burnam, as well as my own experience, shows beyond controversy that uterine fibroids can be dissipated by radiotherapy, including both roentgen and radium treatment.

As I have urged elsewhere, there is no great difference between the effects of the gamma-rays of radium and the hard roentgen rays, which are almost exclusively used in deep therapy. Modern roentgen treatment of deep-seated areas is so conducted

that the filtered rays which reach the deeper parts are only those of high penetration, equalling that of most of the gamma-rays of radium. As a matter of fact, Russ has shown that, while the wave-length of the most penetrating gamma-ray is appreciably shorter than that of the hardest roentgen rays, the waves of some of the gamma-rays are longer. The hardest gamma-rays extend only about one octave higher than the hardest roentgen rays now available. Indeed, Rutherford's recent work indicates that the gamma-rays of radium may be regarded as secondary roentgen rays produced in the radium; Russ further declares that the hard roentgen rays, such as we are using daily, have such a high penetration, that the intensity of a beam is only reduced to 10 per cent. by going through 12 or 13 cm. of tissue. Add to the foregoing a realization of the fact that roentgen tubes are capable of furnishing thousands of times the amount of radiant energy obtainable from, say, 100 mg of radium element, and we begin to appreciate that there is probably not so very much practical difference between these two agents.

The gamma-rays of radium are subject to the same physical laws which govern roentgen irradiation. The law of the inverse square of the distance applies just as truly in radium work. It is not enough to know the amount of filtration and the number of milligram-hours of application; the distance from radiant source to part must also be carefully noted, for only thus may the time of application be governed. The technic of radium application is as yet in many respects as primitive as was the roentgen method sixteen or eighteen years ago. The quantity of hard rays furnished by a roentgen apparatus is certainly very considerably larger than that of gamma-rays from a powerful radio-active substance; and it is possible, therefore, in spite of the lesser penetration of roentgen rays, to achieve a high degree of intensity even through thick filters. Radium has many advantages peculiar to itself, especially that of being applicable within cavities and tumors, thus producing rays directly within the tumor, and offsetting considerably the disadvantage of requiring a much longer time of application. Anyone fortunate

enough to have both agencies at his command will utilize both in combination whenever possible.

Histologically there is no difference, according to Wickham and many others, in the changes produced by radium and the roentgen rays. Von Seuffert declares that radium, mesothorium, and roentgen rays are of about equal value in radiotherapy, all having their limitations in pathologic processes that are too extensive. Pusey has not been able to see any difference whatever so far as clinical effects are concerned. The radio-epidermatitis described by Ragaud and Nogier as occurring after the administration of very high doses of extremely hard roentgen rays is quite analogous to the skin reaction which may follow the application of highly filtered gamma-rays.

That radiotherapy, always referring by this term both to radium and the roentgen rays, is successful in a large class of myoma cases in causing amenorrhea and in reducing the size of the tumor in many cases, is conceded by practically all gynecologists. It has now been practised long enough and in a sufficient number of different clinics to permit of a satisfactory classification as to diagnosis and results.

Mohr gives statistics in 796 consecutive myoma cases, in 56 per cent. of which the hemorrhages were overcome, amenorrhea being produced. These cases have been classified as cured. In 380 cases the size of the tumor was noted, with the following results: unaltered in 21 per cent.; reduced in size in 57 per cent.; marked reduction in size in 13 per cent.; entire disappearance of tumor in about 5 per cent. In 5 cases the tumor actually increased in size.

Kelly has reported relief from hemorrhage and either shrinkage of the tumor or its complete disappearance under radium treatment in all types of myomas. The time required varied from two months to one and one-half years after treatment was begun. Under both radium and roentgenotherapy shrinkage of the tumor continued long after treatment was suspended. It would seem that the most reasonable method of treatment would be a combination of roentgen and radium therapy.

Contenting ourselves with the foregoing brief statements,

we will assume the general acceptance of the fact that radiotherapy is a successful means of therapy employing the roentgen rays, radium, or both, in a certain class of uterine fibroids, a condition for which surgical operation was heretofore the only treatment to afford radical relief. What, then, are the relative merits of the operative and the radiotherapeutic methods in the treatment of this condition?

No deaths can be justly attributed to roentgenotherapy. Certainly very few which have occurred can in any way be attributed to radium therapy, and there is little necessity for any future fatal results from roentgen treatment, now that the technic has been worked out with a considerable degree of satisfaction. We may, therefore, conclude that there is no immediate risk to life with either roentgen or radium treatment.

The operative risk is variable, depending upon the operator. We have reports of so large a series as 150 consecutive cases without any deaths, or, as another authority puts it, 157 cases with only 1 death. But probably the average death-rate in the hands of the average surgeon will vary between 2 and 3 per cent. The occurrence of a fatal case due to mesenteric vascular thrombosis, pulmonary embolism, or some other unlooked for tragic event in operative treatment tends to turn the scale of judgment, at least temporarily, in favor of the radiotherapeutic method. The immediate operative risk, however, is more than offset by the frequency with which necrosis or malignant degeneration occurs. This will be discussed later.

In a general way it may be said that the fatalities following operation are encountered in the surgery of difficult, complicated cases. In uncomplicated cases the simple operation gives a very low mortality—under 1 per cent.

Under roentgen or radium therapy there is none of the shock which may attend the operative treatment of myoma. Neither is there any scar unless one is so unfortunate as to cause the patient a roentgen dermatitis of serious grade. Nevertheless, the scar following operation is of no particular moment, and in the present state of surgical technic the occurrence of shock is becoming less and less frequent. True, there is a certain

amount of nausea, vomiting, and weakness for a number of days after the operation, but all these drawbacks are very much mitigated if the patient has the benefit of careful postoperative management.

For that matter, roentgen and radium therapy have also been attended by considerable physical distress, the so-called "roentgen kater" which has been described and studied by numerous roentgenologists and radiumtherapists. Many theories as to the causation of this phenomenon have been advanced, and various methods of mitigating its unpleasant symptoms have been practised. The "roentgen kater" consists of a general, undefinable, unpleasant feeling accompanied by headache, palpitation, tired feeling, nervousness, and sometimes pain. It has even been suggested that some substance produced as the result of radiation is incorporated into the circulation causing a sort of toxemia, as the result of which the above symptoms are manifested. No one has yet satisfactorily explained the exact cause of this kater, whether it is due to some secretion or product liberated through the effect of the rays, or whether there is an absorption of the rays, pure and simple. These symptoms last from six to sixty hours, usually about twenty-four hours. They do not occur in all patients. Some patients are only slightly affected, while in a few cases the condition is grave. Sometimes negative symptoms are observed, by which are understood manifestations of a neurotic character which had not existed previously in the presence of the hemorrhage. The foregoing symptoms, if they occur at all, may be noted to a certain degree after a single treatment, but usually are more pronounced after a series of treatments.

Taking into account the fact that each series of treatments for fibroids ordinarily extends over two to four days, and that the patient receives from two to four or five series of treatments, if not more, it is easily possible that during the months covered by the radiotherapeutic measures the patient may have to suffer physically, to a greater or less degree, for a number of days totaling more than she would have suffered in connection with an operation. Following a laparotomy for fibroid the patient

spends from two to sixteen days in bed, and is probably incapacitated for the ordinary pursuits of life for another ten to fourteen days. In connection with radiotherapy some patients suffer no inconvenience whatever, while most of them suffer a little, and perhaps one-third of the total number suffer serious inconvenience for a period practically equivalent to the number of days of incapacitation following a laparotomy. Formerly, when larger quantities of radium were used the pain attending the treatment was often very distressing. The present tendency is to employ smaller quantities of radium, say 30 to 50 mg., with adequate filtration, beginning with exposures of a few hours each, at intervals of from one to several days, until five or six exposures have been made. An interval of three or four weeks' rest is allowed to elapse, followed by a second but shorter exposure, and in some cases after an interval of two or three weeks, with a third series of applications. This amount of radium therapy is especially likely to be successful if the roentgen method is employed in conjunction with it. As stated above, while some patients do not suffer any inconvenience, others have been observed to suffer a certain amount of actual pain during the first radium application, still more pain during the second radium séance, and a very considerable amount of pain during the third séance. The pain may become so severe that patients may beg, and frequently do beg, to have the radium removed long before the allotted time has expired. The amount of pain complained of was more pronounced when large quantities of radium were used than with our present plan, where 50 mg. is the maximum quantity employed.

I have also observed that a narrowing of the vagina developed in some cases after radium therapy. The occurrence of this narrowing has been very definitely noted, and in at least 1 case has seriously interfered with later treatment per vaginam. Kelen, of the First University Clinic for Women in Budapest, reported 200 cases of gynecologic disease treated by means of radiotherapy. In all his cases there was narrowing of the vagina during the course of the treatment. This untoward effect probably occurs more often than has been reported.

Following operations one may observe the development of such untoward effects as hernia, intestinal adhesions, nervous unrest, septic peritonitis, phlebitis, ileus, and wounds of the ureters. But the fact should not be lost sight of that with radiotherapy it is also possible to encounter untoward late effects, such as pathologic changes in the blood, damage to the skin, and colitis, quite irrespective of the question whether the tumor has or has not been cured.

An effect upon the skin occurs in about 1 case out of 8. This effect is usually slight, often a mere browning of the skin, but once in a while a severe dermatitis occurs even in the best regulated clinics, partially due, no doubt, to the fact that there is a definite idiosyncrasy to the roentgen rays. McKee, of New York, and several other authorities whose words deserve every consideration, doubt whether such a thing exists as a special sensitiveness to roentgen rays, but from experience I am convinced that such a thing is occasionally encountered. This need not be a serious deterrent, for one can easily make it a rule to give at the first séance a dose of roentgen rays sufficiently small to provide against any possible idiosyncrasy.

Albers-Schoenberg, who was probably the first to apply the roentgen ray in gynecology, has always laid stress upon the necessity of avoiding the intestines in the course of radiotherapy. So far as roentgen rays are concerned, this may be effected with tolerable certainty in uterine exposures by applying the lower brim of the cylinder diaphragm of the tube holder just above the symphysis pubis, and tilting it toward the head sufficiently to allow the axis of the rays to run obliquely into the true pelvis from above downward, as in roentgenography of the urinary bladder. By means of a louffa sponge it is also possible to secure compression, which serves to displace the intestine upward.

Nevertheless the patients sometimes suffer from diarrhea, and at least in one case the continuation of the treatment was made impossible on account of this symptom. Rectal tenesmus is sometimes a very troublesome symptom. Vesicular tenesmus may occasionally be observed, more pronounced in some patients than in others. but it only lasts for a few hours after the appli-

cation of the rays, and so far as I can learn permanent manifestations of this kind have never been observed.

Late damages to the skin have unquestionably occurred. Gauss claims never to have seen any serious harm to the skin when using the 3 mm. filter of aluminum, but he personally demonstrated to me at least one case of skin damage. This may have occurred after writing the statement, later published, that he had never seen any burns. In my own clinic I have seen one case of late injury to the skin where the skin damage did not appear until nine months after the last treatment, but it should be remarked that in the early months of treatment in this case the filtration was only leather and 1 mm. of aluminum. The injured area finally developed an ulceration which persisted for years, eventually becoming malignant.

Desplate reports a case of myoma treated during ten months. In the course of the seventh month an infiltration of the abdominal skin was noticed which assumed the nature of an ulcer by the end of the tenth month, 3 mm of aluminum filter were used in this case.

D'Halluin reports 2 cases treated during seven months, two treatments per month, using 2 to 3½ mm of aluminum as filter, dosage 2.8 Bordier units. Seven months after the last treatment an infiltration appeared which later changed into ulcer.

Bordier has observed at least 3 cases in which injuries were first noticeable six to twelve months after the termination of the roentgen treatment.

Speder described 3 cases of myoma where, six or seven months after treatment, deep reaction set in attended by marked pain and requiring six to seven months to heal. It may be mentioned that in practically all these cases of late skin injury an occasional slight erythema has been allowed to occur during the application of the rays.

Bevan has personally communicated to me a case in which about a year after the last application of roentgenotherapy for myoma a roentgen ulceration appeared on the skin of the suprapubic region, which later took on malignant characteristics

Bumm, of Berlin, has stated repeatedly that the vaginal

surface is very much more tolerant of roentgen rays than the abdominal skin. Nevertheless, my own experience agrees with that of Romminger, who observed that vaginal erythema may appear somewhat later than the surface lesions, but in an intensified form.

Taking into consideration all the available data we must admit that it is possible for late and even very late injuries to manifest themselves in the areas that have been exposed to the rays, even though great care has been exercised in the applications.

Is the tumor cured by radiotherapy? Immelman stated in 1912 that he could only speak of 50 per cent of cures in myoma patients, he had rarely seen complete involution of the myoma. Mohr reported cures in 56.2 per cent of 796 cases. Johannes reported 83 per cent of cures in a series of 1395 myoma cases. The operative cure is practically 100 per cent. The percentage of radiotherapeutic cure naturally depends in large measure on the efficiency of the radiologist. Pfahler was probably the American pioneer in deep roentgenotherapy and one of the first to treat myoma with the roentgen ray. His results have been very encouraging. He lays special emphasis upon the necessity that the cases should be carefully selected by gynecologists but treated by an expert radiotherapist. In a paper read before the Clinical Congress of Surgeons in 1916 I emphasized the fact that the same principles which must be so carefully observed in roentgenotherapy also apply in radium therapy, and I would take this occasion to reiterate its importance in view of the fact that but few gynecologists or general surgeons seem to understand the principles upon which the measurement of dosage in radiotherapy is based.

Kelly has been very enthusiastic over the results of his radium therapy in myoma cases, and hopes to cause the disappearance of the tumor in 90 per cent of the cases without serious discomfort or risk. Abbe, of New York, agrees with Kelly that radium treatment is ideal in certain cases of uterine fibroids but he does not recommend the treatment in cases of pedunculated tumors.

Reference has above been made to the fact that in many cases of operation for myoma the patient has constipation following operation. In a paper before the Michigan State Medical Society in August, 1916, I raised the question as to the advisability of utilizing the pelvic colon to peritonize raw surfaces following such pelvic operations as hysterectomy. That this procedure is reasonable to a certain degree admits, in my opinion, of no doubt, but I also feel that many cases of postoperative constipation are due to postoperative adhesions of the pelvic colon which has been placed in an unfavorable situation. Conditions are quite different with roentgenized patients, for although myoma sufferers frequently complain of obstinate constipation, this often disappears after roentgen treatment.

In operated as well as in roentgenized patients there usually occurs an increase in body weight and an increase in hemoglobin.

In my own experience, at first employing roentgenotherapy alone, but later in combination with radium therapy, I have observed in about one-half of the cases a distinct diminution in the size of the tumor which can be determined upon external palpation. In half of the remaining cases there is a less distinct retrogression in the size of the tumor, as determined by bimanual examination. In the remaining quarter of the cases no change could be noticed in the size of the tumor except that in at least 2 cases the tumor definitely increased in size in spite of the roentgen treatment. The following is an example of the very striking result which is sometimes obtained: A very large tumor, reaching two or three fingerbreaths above the navel, was so reduced within eighteen months that its presence could only be determined by bimanual examination, the uterus being approximately twice the normal size. It was interesting to note that the retrogression in this case continued gradually even after the discontinuance of the treatment, which terminated with the fifth series of applications of roentgenotherapy, one series a month. It is not at all uncommon in comparing notes with other men having a large amount of material at their disposal to learn of cases where a tumor which originally filled the true pelvis was finally reduced to the size of a goose egg. The tumors

I reported as unchanged had occurred mostly in older women and had existed for a long time without appreciable change in size. The fact that retrogression in the size of myoma continues in many cases long after the cessation of treatment does not mean at all that such a manifestation must necessarily be due to a prolonged after effect of the roentgen rays. It may be due to a state of complete cessation of ovarian function.

The difficulty of making a correct diagnosis of uncomplicated intramural myoma constitutes one of the chief drawbacks to the radiotherapeutic management of uterine fibroids. The chief of one of the largest surgical clinics in this country recently stated to me in conversation that gross errors in abdominal diagnosis occurred in about 16 per cent. of the cases which came to operation. Many of the unsuccessful cases in roentgen and radium therapy are based upon incorrect diagnoses. The percentage of incorrect diagnoses will be diminished if we follow the advice of Pfahler, who very properly urges that the cases for treatment must be selected by gynecologists but he insists they must be treated by roentgenologists. A pseudomucous cyst adherent to the right side of the uterus, may be mistaken for uterine fibroid. A large cyst of the ovary may be found adherent to the uterus which also contains myomata. Such a patient might be treated for a long time, even with disappearance of the myomata and still remain uncured. In another instance a supposed myoma proved to be a spindle cell sarcoma of the right ovary. Submucous or pedunculated myomata are not good subjects for radiotherapy. Calcified fibroid tumors, of course, can never be reduced except by operation. The chief danger in ray treatment lies in the fact that the absolute diagnosis of uncomplicated fibroids is frequently very difficult and there is a great chance of overlooking malignancy or associated inflammation of the uterine appendages or of the appendix vermiformis. Uterine and ovarian degeneration are very common in the presence of fibroids.

Tracy¹ found in a series of 3561 operative cases of uterine fibroids 1189 cases of associated diseases, including degenerative

¹ Penn Med Jour vol xviii p 353

changes in the tumors, lesions of the appendages, and even malignancy, in all of which it was impossible to hope for cure from roentgen or radium therapy alone. This amounted to exactly one-third of the cases. In 501 cases, or approximately 14 per cent., the degeneration and changes in the tumors and uterus and in the appendages were such that the lives of the patients would sooner or later surely have been sacrificed had they been treated only by radiotherapy. In addition to these 501 cases there were 405 patients with ovarian cysts and abscesses of the broad ligaments, tubo-ovarian abscesses, pyosalpinx, and ectopic gestation, in none of which could the roentgen rays have possibly cured the troubles, and in practically all of which failure to attend to the lesions would have resulted in the loss of the patient's life. Tracy's figures constitute a very serious arraignment of radiotherapeutic treatment of fibroids, to which it is very difficult to find a satisfactory answer.

Early malignancies constitute a very decided drawback to radiotherapy in myomata. Various statistics have been furnished as to the frequency of malignant degeneration and sarcomata. Klein, of Munich, is authority for the statement that 7.7 per cent. of all myomata exhibit malignant degeneration. Franque calls attention to the fact that sarcomatous degeneration is found in 3 to 6 per cent. of his cases. Winter found sarcomatous degeneration in 2 per cent. of the subserous, 4 per cent. of the interstitial, and 9 per cent. of the submucous myomata. In Franque's cases a preoperative diagnosis of malignancy could only be made in 6 cases of sarcoma out of 13.

Olow, of the University of Lund, Sweden, found that 5.2 per cent. of the operative uterine myoma cases were complicated with malignancy. A very significant fact is that the presence of cancer had not been diagnosed in any of these cases before operation and had been suspected in one only. On account of the ease with which amenorrhea is produced in women past the age of forty it is common for advocates of the radiotherapeutic method to urge the ray treatment of fibroid tumors of the uterus in women past that age. However, Tracy investigated the age at which degeneration takes place in myoma, and found

that 90 per cent. of the malignant degeneration takes place in women past the age of forty.

Certain writers claim that no observations have been reported in which malignancy developed in the uterus after it had been treated for myoma with the x-ray or radium. Shoemaker reported the case of a patient who was given radiotherapy for uterine myoma over a period of two years. Five years later hemorrhages reappeared. Abdominal hysterectomy was advised and performed. The tissue removed was reported by the pathologist to be a fibroid tumor undergoing malignant degeneration. I personally know of a case where a large fibroid myoma of the uterus, reaching well above the navel, was treated four years ago with both roentgen and radium therapy, and is now the seat of a definite carcinoma. Doubtless other similar cases have been recorded. On the other hand, Montgomery,¹ of Philadelphia, has recently reported in his clinic 3 cases where carcinoma developed in the stump of the uterus several years (in 1 case nine years) after supravaginal hysterectomy for myoma.

Another very important consideration concerns the conservation of ovarian function. Roentgenization of the pelvis for uterine fibroid affects chiefly the ovaries, the diminution in the size of the tumor and in the amount of hemorrhage being brought about largely through the effects upon the ovarian tissue. The ovaries undergo atrophy, particularly of the graafian follicles. This effect occurs more readily and permanently in older women; the younger the patient, the longer must be the treatment to accomplish atrophy of the follicles. Nor is the effect necessarily permanent in the younger women because of the powerful regenerative processes in the ovaries. Although Kelly claims radium has a very much less marked degenerative effect upon the ovaries, it is the general opinion of radiologists that radium and the roentgen rays are identical in effect.

But the rays not only influence the ovaries; they also effect the myomatous tissue. Meyer and Grafenberg, Eymer, Bordier, Albers-Schoenberg, and others have subscribed to this belief. Meyer drew his conclusions from the microscopic changes demon-

¹ Jour. Amer. Med. Assoc., 1915, vol. lxiv, p. 1653.

strated in the tumor tissues. Another proof that the tumor tissue is influenced directly is found in the occasional observation of a decrease of volume of the tumor even while uterine hemorrhages persist. Bordier was able to cause by roentgen therapy almost complete dissipation of a large fibroid tumor in a woman whose ovaries had been removed many years previously.

Nevertheless, granting that both roentgen rays and radium may have a direct effect upon myoma tissue, we must agree that the chief influence is brought about through degeneration of the ovaries. The internal secretion of the ovaries may or may not be destroyed according to the dosage administered; the more intensive and the more successful the treatment, the more is there a likelihood of destroying the internal secretions. Surgery, however, conserves the ovaries, or at least one ovary, whenever possible, and this is possible in about one-third of the cases. Bilateral degeneration of the ovaries is a common accompaniment of a fibroid uterus, occurring in perhaps 30 per cent. of the cases. We are sometimes asked why one should balk at radiotherapy for fear of causing degeneration when in nearly one-third of the cases the ovaries are already degenerating? The age of the patient is perhaps the most important consideration in answering this question. When considering the question of preserving ovarian function we must admit that laparotomy is far preferable to radiotherapy. In women who have not passed the menopause at operation it will often prove that myomectomy is sufficient, even the function of the uterus being retained. When myomectomy is feasible its mortality is below 1 per cent.

Diabetes, severe anemia, and serious heart disease have been suggested as contraindicating operative management of myomas. In this class of patients radiotherapy may be definitely indicated, but this is true only to a limited extent, for operations upon diabetics, anemics, and cases of cardiac lesions have been rendered much safer by present-day operative and postoperative methods. Newer methods of anesthesia have diminished the amount of danger involved. It would seem proper to limit the roentgen treatment of fibroids to women whose general health is so much below

par, from any cause, that they could not withstand the shock of operation, and to cases of marked anemia due to uterine hemorrhage in which to temporarily control the bleeding until the patient is sufficiently restored to health to undergo an operation. It has happened in my own work that sometimes the patient's condition so improves under ray treatment that she refuses operative treatment.

The expense is about the same for ray treatment as for operation. The ray treatment should only be entrusted to competent and experienced men who have an adequate equipment at their disposal. Pfahler has repeatedly urged the necessity of competence on the part of the physician who administers the roentgen and radium treatment. The operative fee plus the hospital expense is very little if any greater than the fee which a competent radiotherapist deserves for his work.

Only cases of uncomplicated intramural fibroids, or cases in which operation is declined or contraindicated by serious organic disease, should be subjected to ray treatment. Possibly there are some extremely neurotic individuals for whom the rays would also be preferable. The ray treatment should not be used when time is a factor, and it cannot be used with safety in rapidly growing tumors, in fibroids complicating pregnancy, or where serious disease exists in the tubes or ovaries. The rays should never be used in any case where complete preliminary curetage with microscopic examination of the curetings is not feasible.



CLINIC OF DR THOMAS J WATKINS

ST. LUKE'S HOSPITAL

PERINEORRHAPHY

Summary A patient with prolapse and hyperplasia of the uterus, cystocele, and rectocele, principles and technic of perineorrhaphy, denudation should not include exposure of levator ani muscle, repair of perineal defect by purse-string sutures, after-care

THIS patient gives the following history Mrs K, age fifty-five years, married thirty-seven years, weight 155 pounds, which is her normal weight

Family history is negative

Past history She has always been well except for an occasional headache, inflammatory rheumatism twelve years ago and some digestive disturbances

Present illness Complains of a protrusion from the vagina when on her feet Walking and standing are attended by a feeling of weight in the pelvis and backache She has some frequency of urination Counterpressure is required on the rectocele to empty the bowels when they are constipated

Births Ten No complications during pregnancy, delivery, or convalescence

Menstrual Menopause six years ago

No vaginal discharge No vesicle symptoms except an increased frequency Bowels constipated—uses cathartics Has occasional disturbances of digestion Sleeps well

Physical examination Abdominal, negative Vaginal Cystocele and rectocele, both of which protrude on straining Uterus Moderate prolapse, cervix 1 inch from vulva Uterus is 3 inches deep The diagnosis is prolapse of the uterus, hyperplasia of the uterus due to displacement, cystocele, and rectocele

The treatment proposed is exploration of the uterus to be followed by hysterectomy or the transposition operation, depending upon the findings as to malignancy or benignancy.

The uterus dilates easily and the curet brings away very little tissue. Vaginal section indicates no suspicion of carcinoma, so that a modified transposition operation is made, excising some of the body of the uterus and the anterior portion of the cervix, leaving enough of the cervix and body to give a firm support to the bladder. As I have written upon this subject frequently of late, the remainder of my talk will be limited to a discussion of the perineal operation.

This subject may be considered threadbare, but the subject is, as we know, not completed, as the operations have not become standardized. As the operation is frequently very badly performed, the results are often unsatisfactory. Technical difficulties continue to exist notwithstanding that the principles of the operation are comparatively simple and the operative wound is relatively accessible. The operation is especially important, as lacerations of the perineum are common, and there are few operations which give as much relief when good results are obtained.

The physical findings upon examination of the perineum in this case show a large rectocele, which is essentially a hernia of the rectum through the posterior vaginal wall. The levator ani muscle with its accompanying fascia has been injured on each side, mostly in the region of the pubic portion of the muscle, which has permitted the perineum to drop backward in the line of the coccyx. Palpation with the finger on either side shows a very defective muscle with an extensive amount of relaxation.

The principles of all perineal operations should be the restoration of the levator ani muscle and fascia. All other considerations are minor and their discussion only obscures the subject. The principles upon which all perineal operations are based are only two: (1) The shortening of the levator ani muscle and fascia to their normal lengths by sutures which run longitudinally or obliquely in the line of the muscle; (2) uniting the muscles of the two sides in the median line. The first is the

principal feature of the Emmet operation. The second is the Hegar operation. All modern operations for repair of the perineum are modifications of these two. The transversus perinei muscle is so unimportant that its individual consideration is unnecessary.

The operation which we propose to do will close as much as possible of the hernial opening through which the anterior rectal wall protrudes. We will shorten the levator ani muscle on either side and unite parts of them together anteriorly to the hernial opening and thus restore the perineal body to its normal location—near the pubic bone.

Denudation.—The denudation should extend to the upper border of the levator ani muscle. There is nothing to be accomplished by extending it farther into the vagina, as there are no fixed tissues for anchorage above this muscle until the broad ligaments are reached. The denudation may be made by blunt dissection or by removing the mucosa in strips, the choice depending upon the case as to the presence of scar-tissue, granulation tissue, and the experience of the operator. Considerable has been said pro and con relative to the exposure of the levator ani muscle. After considerable experience with exposure of this muscle, we believe that to do so is usually an error, as it increases considerably the amount of postoperative pain. The amount of bleeding is more and the results, we believe, not so good as with a more superficial denudation. The reasons for the results not being so good are that sutures of the muscle without the intervention of fascia either cut into the muscle or cause muscular atrophy. It is always well to remember that union of a muscle is by connective tissue, and that there is no such thing as a musculomuscular union without the intervention of connective tissue.

Sutures.—Catgut is employed as it gives satisfactory results and does not have to be removed. We see no reason for using a non-absorbable suture except an occasional one in a case of complete laceration. It is a rule that too many sutures are used for the size of the wound, as the perineal wound is rather small except when put on the stretch. The reason why an

excessive amount of suture material is generally used is because the wound is much stretched while most of the sutures are being introduced.

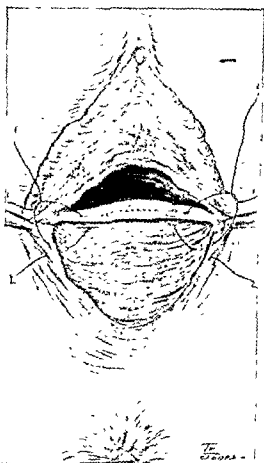


Fig 221 —The denudation extends from the skin to the border of the levator ani muscle—nearest to the cervix. Sutures 1 and 2 are inserted.

Figure 221 shows the closure of the angle of the wound to either side of the vagina with No 2 iodn catgut. Care should be taken that this suture includes the vaginal artery on either side, which is almost invariably present and injured. Any other bleeding points should be attended to at this time by suture

or ligature. The suture at either side is tied and cut. The second suture introduced is the same suture that Emmet called the "crown-stitch," and is here inserted solely for the purpose of insuring complete closure of the vaginal wound. This suture is

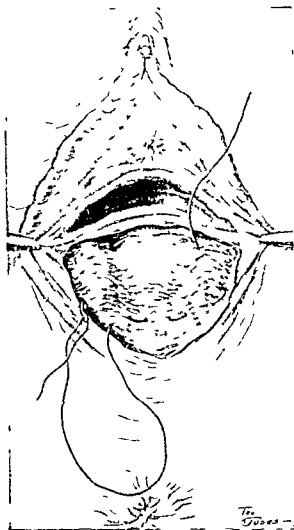


Fig. 222—The "purse string" of the rectocele is illustrated unobstructed by the presence of sutures 1 and 2 which are shown in Fig. 221. The position of the needle shows the location and depth of the suture at the sides.

not tied until the rest of the wound is closed in order to simplify the introduction of other sutures. The third suture in Fig. 222 is a purse-string suture, which includes a liberal amount of the levator ani muscle—the pubic portion—on either side

and extends across the lower border of the rectocele, which is the anterior portion of the triangular ligament. This suture when tied, closes the hernial opening of the rectocele as completely as it seems possible to do. In the case of a very large

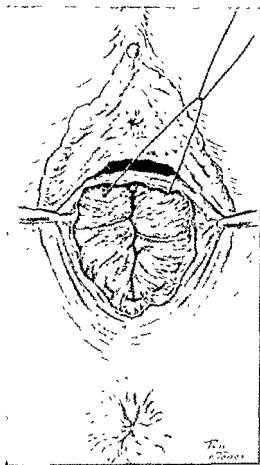


Fig. 223 —The first "purse-string" suture is tied and a second one is inserted.

rectocele its size is lessened by inserting one or two purse-string sutures over the rectocele, using fine suture material in a small non-cutting needle. This minimizes the amount of "dead space" and lessens the danger of bleeding. The danger of bleeding into this space is considerable if one does not use

care in regard to it. In Fig 222 sutures 1 and 2 are omitted to simplify the illustration. The result of the purse-string suture when tied is shown in Fig 223. Observation of the result of this suture shows that the hernial opening has been

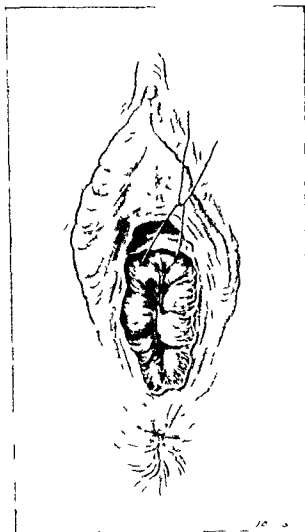


Fig 224 —A third "purse string" suture is used in extensive tears

completely closed, and that the triangular ligament has been drawn forward and inward in the line of the pubic bone. The perineal body is correspondingly replaced anteriorly. Figure 223 shows a second purse-string which reinforces the first and lessens the size of the wound and continues to draw the perineum

forward and inward. Figure 224 is the third purse-string suture which is used in extensive lacerations, but is not needed in smaller lesions, and has the same effect upon the wound as the previous suture. Figure 225 shows the wound closed with a sub-

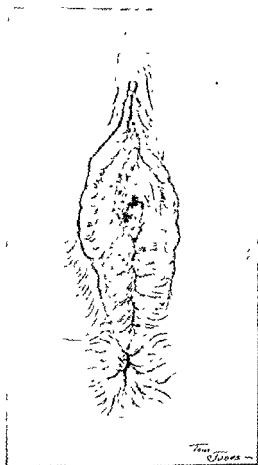


Fig. 225 —The closure of the wound is completed by a subcuticular suture

cuticular suture, which should be so placed as to give accurate approximation. This suture materially lessens the postoperative discomfort, and is not so easily accessible to the vaginal bacteria as sutures which include the mucosa and skin. The "crown-stitch" suture is tied at the end of the operation.

The after-care of perineal cases has become very simple. Douches are not given. Very little dressing should be kept over the perineum, so that the surface will remain dry. The use of thick dressings keeps the wound moist and unsealed. Normal urine does not injure the wound, but may produce some irritation if allowed to decompose. Consequently, a cleansing solution is poured over the perineum after each urination and the wound is dried. The patient is allowed to get up as soon as she desires. She is cautioned against straining in emptying the bladder or bowel. The test as to the result which we have obtained will consist in observation of the place which the perineal body now occupies, which is near the pubic bone. Palpation over the levator ani muscle on either side of the newly formed vaginal canal shows a thick muscle which does not readily yield to pressure.



CLINIC OF DR. CAREY CULBERTSON

PRESBYTERIAN HOSPITAL

THERAPEUTIC ABORTION AND STERILIZATION

Summary A patient, twenty-three years of age, pregnant, and presenting symptoms of neurasthenia, enteroptosis, incipient pulmonary tuberculosis, and hyperemesis gravidarum, discussion of the general indications for therapeutic abortion, importance of tuberculosis and its bearing on the present case, desirability of sterilizing patient at the time abortion is done, vaginal and abdominal routes for producing abortion, technic of abdominal cesarean section in the early weeks of pregnancy, methods of sterilization, detailed technic of a method which, while thorough, permits the subsequent restoration of fertility note on ether gas-oxygen anesthesia for laparotomies

THE case for demonstration at this time presents the following history and clinical findings

The patient is a young woman, twenty-three years of age, housewife, who has been married four years Her complaint is as follows The last two menstrual periods have been missed She is nauseated all day long and constantly vomiting, unable to retain food For the past two weeks she has been confined to bed For the past year she has complained of fatigue on effort She is tired when she gets up in the morning The weariness is only relieved by lying down She does her own housework and cares for her children, and as a result of the household responsibility and continued fatigue has become very nervous and irritable Before her marriage she claims to have weighed 143 pounds Her present weight is 113 pounds In addition to this, she complains of pains, especially in the right leg and in the perineal region, and severe and constant backache, which is not relieved by lying down

She began menstruating at fourteen Her periods were regular, every twenty-eight days Since the birth of her first child they have been rather profuse, lasting now seven or eight

days, whereas before her marriage they lasted four days. There is no dysmenorrhea. Her last period occurred on October 15th. There has been some recent vaginal discharge. There are no vesical symptoms, but she complains of chronic constipation, requiring more or less catharsis daily to secure bowel movements. Her appetite has not been good for a long time, a year or more, and she eats very little food. Her children are three years and fifteen months of age respectively. Her pregnancies were normal except for a moderate amount of emesis in the early months. Her labors were both spontaneous. There have been no miscarriages. This patient has been under the care of an internist for the past two or three months. She has been treated for nausea and vomiting and for her other general complaints by rest in bed and diet, without, however, any very considerable relief.

Examination shows her to be a slender, undernourished young woman, with little subcutaneous fat. Her pulse is rapid and slightly irregular, but the heart shows no valvular lesion and no evidence of myocardial changes. Expiration is prolonged over the right apex and râles have been observed here from time to time. There is a slight enlargement of the median lobe of the thyroid gland. Her abdomen is lax, diastatic and striated, and there are no tender points. There is a small, round, firm mass palpable just above the symphysis and behind it, which is free and not tender. The vagina is slightly relaxed, deep, and distensible. There is an evident cyanosis. The cervix is multiparous, soft, patulous and free, and points downward and back. The corpus is upright, anteflexed, enlarged, soft, and resilient, and it is identical with the mass palpable through the abdominal wall. There are marked varices of the vulva and of both legs.

Laboratory examination in this case shows the following: Sputum is negative for tubercle bacilli. The urine shows no albumin, casts, nor pus cells. Hemoglobin is 70 per cent. There is a leukocytosis of 11,600. Her temperature has been somewhat variable, but never high, 99.6° F. being the highest that it has gone since she has been under observation, but it

has been over 99° F nearly every day for the past three weeks. There is a notation in the record that inflation of the stomach reveals considerable descensus on the part of this organ, the lesser curvature coming down as far as the umbilicus the greater curvature as far as the pelvis. The right kidney is distinctly palpable below its normal position, the left not so definite.

This case presents the following proposition. We have here a young woman who has had two children, the last only fifteen months ago, who is now pregnant for the third time, who has suffered for a considerable period of time from that train of symptoms which characterizes enteroptosis, and in whom there is a possible lesion in the right pulmonary apex. Her irregular and rapid pulse may be explained by the moderate enlargement of the thyroid. The previous diagnosis of enteroptosis and neurasthenia, which has been made by the internist, is readily concurred in, the neurasthenia being frequently due to the general ptosis which these cases present. Ptosis is a very frequent finding in this type of woman—thin, undernourished, poorly muscled—being but one expression of the general muscular deficiency which obtains. These patients, ambitious to maintain a home and properly care for their children, are not lazy, but as a result of the continued and repeated drag in the abdomen experience this marked fatigue on effort, which is only relieved by getting off their feet. The varicose veins of the vulva and limbs are merely other expressions of this same general condition. We have further a probability of an early incipient tuberculous process in the apex of the right lung. While the tubercle bacilli have not been recovered and the patient has had no cough or expectoration nevertheless the presence of râles and the prolonged expiration in this region is certainly suggestive of an approaching tuberculosis. Taking all these conditions together, it has seemed best to interrupt this pregnancy. In view of this fact, the patient and her husband have both requested that whatever seems best should be done to prevent subsequent pregnancies at least for the present. Such a proposition is entirely agreeable to the physician for the reason that so often where therapeutic abortion is under

taken in a case of this sort, and some method of sterilization is not done, one has only to repeat the abortion in a few months, a feature of the case which is very undesirable.

While I would not go so far as to state that this patient is suffering from hyperemesis gravidarum, yet the fact that careful treatment in bed has not alleviated the vomiting is suggestive.

In considering, then, therapeutic abortion as the best thing at this time in this patient, I desire to outline very briefly the indications for its use. Without going into the legal or moral phases of therapeutic abortion, the following indications may be stated as those which are generally accepted today:

(1) Contracted pelvis, where the conjugata vera is 6 cm. As a matter of fact, this is an old indication, which in the majority of clinics does not stand today, since we prefer now to let such a case go to term and to treat it by cesarean section, at which time sterilization may be performed or not, as seems best.

(2) Hyperemesis gravidarum and the toxemia of pregnancy. These two conditions are accepted as good indications today, the hyperemesis implying, of course, that the patient has been under treatment without avail, and that the condition is more than the mere nausea or vomiting of the early weeks of pregnancy, and that the patient has lost weight from her inability to assimilate food. Toxemia of pregnancy gives us one of the best indications for therapeutic abortion, so that, as a matter of fact, the claim may be made at this time that no pregnant woman need go on to convulsions. In the majority of cases, of course, the toxemia improves under careful treatment.

(3) Tuberculosis. This, in my opinion, is one of the best indications that we have for therapeutic abortion, particularly where the tuberculosis is active or, in other words, advancing. In latent tuberculous processes there will arise, of course, the question as to whether abortion is necessary or not.

(4) Heart disease. Certain valvular heart lesions, certain myocardial lesions, and degenerative processes may stand pregnancy and labor without any great harm, but the great majority of valvular lesions are made worse by pregnancy and

labor, particularly the stenotic lesions, all of which give a more or less unfavorable prognosis

(5) Diseases of the kidney Like cardiac and pulmonary lesions, nephritis may not warrant therapeutic abortion, but this lesion will show exacerbations during pregnancy, and, especially if a retinitis has developed, provides a very urgent indication for the termination of the pregnancy

(6) Diabetes and other constitutional diseases aside from those given, where we have only a relative indication for the termination of pregnancy In some cases it is undoubtedly the best thing In other cases the pregnancy may safely enough be maintained

(7) Retroflexion This is only an indication for therapeutic abortion where it is impossible, for some reason or other, to restore the uterus to its original position in the hope of maintaining the pregnancy intact

(8) Hyperthyroidism leukemia, pernicious anemia, epilepsy, and chorea are also but relative indications for the termination of pregnancy Certainly it would seem that pernicious anemia should be so managed The great majority of clinicians deem it wiser that a woman suffering from epilepsy and chorea should not reproduce

(9) Diseases of the ovum, such as polyhydramnios, vesicular mole, death of the fetus, etc are indications rather for emptying the uterus in the way of treating the disease than for a therapeutic abortion, which implies a destruction of the fetus Where the fetus is already dead or where diseases of the ovum, such as vesicular mole, are usually not associated with the development of the fetus these conditions do not come in properly as indications for therapeutic abortion Closely allied with the nervous diseases just mentioned are insanity, idiocy etc Here we have certainly, from a sociologic point of view, a very good reason indeed for not only terminating but preventing pregnancy Various other conditions have been offered by different writers as indications, such as cancer of the uterus and other malignant growths, hemorrhages in the early months, eclampsia, etc As a matter of fact, these conditions tend rather to take care

of themselves, though there will be instances where, the pregnancy not terminating spontaneously, artificial abortion becomes necessary later.

With respect to this particular case and the imminence of the tuberculous process it has been shown by Kunreuther that 73 per cent. of tuberculous patients get worse during pregnancy and 49 per cent. of them die; that there are exacerbations of the tuberculous process during pregnancy in 68 per cent. of the cases which have become stationary. In one series of 1035 cases 95 per cent. grew worse during pregnancy. In another series 50 per cent. grew worse or died.

It is always desirable, in performing a therapeutic abortion and some operation for sterilization, to limit this work to those women who already have children. It should always be done in a good hospital and under the very strictest aseptic precautions. The methods may be classified as follows:

A Vaginal.

1. Bougie or sound or tent.
2. Injection of fluids into the uterus.
3. Tampons or colpeurynter.
4. Dilatation of the cervix and removal of the ovum by instruments or with the fingers.
5. Vaginal cesarean section after the twelfth week.

B Abdominal.

1. By hysterotomy, that is, cesarean section.
- 2 By hysterectomy.

C. With intensive doses of x-ray or radium.

Without going into these methods in detail, it will suffice to say that the bougie, injection of fluids into the uterus, and tampons are not desirable methods in hospital practice. Dilatation of the cervix and removal of the ovum at one sitting is a very excellent method of terminating pregnancy in the early weeks, and, where nothing further is to be done, is perhaps the most desirable, except that it should always be remembered that any invasion of the uterine cavity by the vaginal route is always attended by the danger of infection. After the twelfth week, as has been stated, vaginal cesarean section is the bet-

ter method, particularly in those cases where the cervix does not dilate readily. The abdominal methods are most generally employed at term. They may be employed earlier, as will be demonstrated in this particular case. The use of x ray or radium for the termination of pregnancy has not been generally employed and is not only problematic, but still in the experimental stage.

In this particular case it has been decided to empty the uterus through the abdomen and then to perform a conservative sterilization procedure that will now be demonstrated. The abdominal wall is opened by a high incision, commencing just below the umbilicus and terminating three fingerbreadths above the symphysis. Before opening the peritoneum the patient is tipped into the Trendelenburg position so that the intestines will have fallen away when the peritoneum is incised. The reason for this high incision will be brought out later. After the abdomen is opened and retractors in place the intestines are packed off. The uterus is then grasped by a volsellum just anterior to the midline of the fundus, and is drawn back toward the promontory of the sacrum. The conditions in this case are as follows. The uterus is enlarged about three times its normal size and is soft and free. Both tubes are straight and free except the left one, which is slightly adherent near the left ovarian ligament and to the left ovary. The right ovary is small and firm. The left is moderately enlarged by the corpus luteum. There are marked varicose veins in both upper broad ligaments between the tubes and ovaries and in the infundibulopelvic ligament. The appendix is retrocecal and is adherent at its tip and 4 inches long. The cecum is very mobile. The greater curvature of the stomach comes well below the umbilicus. The transverse colon comes into the false pelvis. The right kidney has an excursion of 4 inches, the left, of 2½ or 3 inches.

After the uterus has been grasped and pulled back toward the promontory of the sacrum an ampule of pituitrin is injected into its anterior wall. We now wait about thirty or forty seconds for this to produce a contraction of the uterus and as soon as the uterus is firm, as it is now, we make a longitudinal incision

in its anterior wall about 2 inches in length. As the incision is made the uterine wall gapes open, as you see, and the gestation sac begins spontaneously to extrude. It comes out of the uterine cavity unruptured. You have here the entire ovum unruptured, covered on its entire circumference by the chorionic villi. They are matted together in areas by portions of the decidua which has torn away with the ovum. That most of the decidua, however, has remained attached to the uterine wall is evident. This can be removed very well by merely scraping it out of the small uterine cavity with the gloved finger. It is not necessary to use a sharp curet, or a dull one either, for this purpose. As a matter of fact, the cervix is soft and patulous in pregnancy, and whatever portion of the decidua must come away will readily do so by drainage through the cervical canal.

The uterus is now held together by the fingers of the assistant, and its incised walls are sutured. This is done in a two-stage method exactly similar to the method we employ in cesarean section at term, except that there we close the uterine wall by a three-stage suture instead. The first row of iodine catgut takes in the inner half of the uterine wall at either side, not including the decidua, and is a continuous suture. The second is a continuous suture and takes in the rest of the uterine wall, including the peritoneal layer. It is sutured in such a way that the peritoneal fold is inverted into the wound, so that when this is accomplished no further peritonization is necessary. The uterus having now been closed, the next part of the operation includes the sterilization procedure. This brings us to a discussion of sterilization.

This operation is done by a great variety of methods, all of which, however, may be classified into two groups, those of the vaginal route and those of the abdominal route.

(1) Vaginal route:

- A. Atmocausis and zestocausis, that is, a destruction of the mucous membrane of the corpus by superheated air or live steam, a method which was developed by Pincus some years ago.

B. Electrocauterization of the tubal openings through the uterus, a method which has been recently advocated by Dickinson.

C. Colpotomy for the treatment of the tubes or ovaries. This is done either through the anterior or posterior vaginal vault, and usually consists in either bilateral salpingectomy or else a resection of the uterine ends of both tubes.

(2) Abdominal route:

A. Hysterectomy, as has been advocated by Kureuther.

B. Resection of the tubes partially or completely or some plastic procedure on the ovaries.

The treatment of the tubes or ovaries by the vaginal route is based upon the same principles as when they are treated by the abdominal route. With a resection of the uterine ends of the tubes the most important thing is the method by which the uterine ends are closed, no matter whether the operation is performed from below or by abdominal section. In presenting this case we will discuss only the methods followed when the operation is attempted by the abdominal route. As hysterectomy is never desirable or necessary, we will omit it. Likewise we will not consider oöphorectomy. This leaves us free to discuss merely the methods of tubal sterilization. Recently excellent and thorough reviews of these methods have been offered by Heineberg and Littig. The older and more simple methods, such as ligation and division of the tubes or crushing of the tubes with or without ligation, have been shown by the two operators just cited to be entirely inadequate. The reasons for this are not difficult to understand. Suffice it to say that cases treated in this way have subsequently become pregnant. I prefer to speak, then, only of the more recent methods of tubal sterilization. There are two groups of these. First, those operations upon the uterine end of the tube, such as have been proposed by Beuttner, Kirshoff, Van Meter, Taussig, Rissmann, Holzapfel, de Tarnowsky, and Rocky. These methods closely resemble

each other in many particulars. They involve a resection of the tubes from the uterine wall, and in every case closure of the uterine horns. The free end of the tube is disposed of in various ways. De Tarnowsky's method has the advantage over the others that it makes a subsequent restoration of fertility possible. This is the only one presenting that advantage. The second group consists in operations upon the fimbriated ends of the tubes. These have been presented by Blietz, Stetten, and Stoeckel. Here the fimbriated end of the tube is freed more or less from its attachments and is disposed of in various ways. In one instance it is brought up through the inguinal ring to the abdominal wall. In another instance it is brought up directly through the abdominal wall beneath the skin. A third group might include those procedures whereby the entire tube is rolled up in a fold of the broad ligament, where it is buried by continuous catgut sutures.

Simultaneous abortion and tubal sterilization is not an original procedure, it having been introduced into the literature by Hofmann, Sellbaum, Andreas, and Findley. These operators empty the uterus as has just been done, and all resect the uterine ends of the tubes except Findley, who advocates a resection of the entire tubes.

As you see, the uterus is still grasped by the volsellum and the fundus is still held back toward the promontory of the sacrum. Now I seize the left ligament about 6 cm. from the uterine horn and lift it up. This permits the two layers of the broad ligament to fold together beneath it, thus producing a clear space. A long forceps is now passed through the bottom of this clear space, from before backward, by means of a small incision. It is made to seize the fimbriated end of the left tube. This is now pulled through into the anterior culdesac and stitched by a single through-and-through catgut suture to the bottom of the anterior culdesac. This is a light, simple suture not involving the entire tube lumen or closing it in any way. The right round ligament is now seized and elevated similarly. The forceps is passed beneath it through the broad ligament, and the right tubal infundibulum is brought forward and fixed in the same

manner (Fig 226) Now I remove the anterior blade of the retractor and catch the free peritoneal edge at a central and two lateral points by three forceps in order to lift it well into the

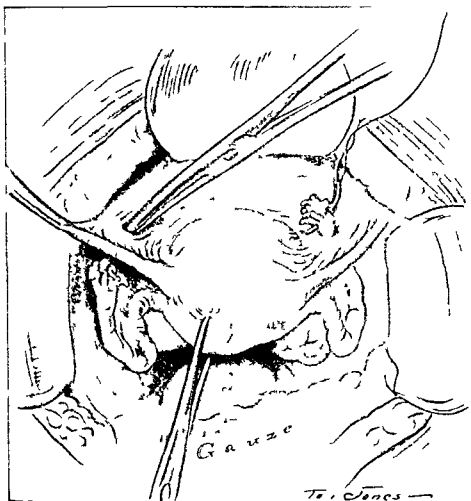


Fig 226—The fundus of the uterus is retracted toward the promontory of the sacrum. The left round ligament has been seized by forceps 6 cm from the uterus and raised up. One inch below its edge an 8-inch clamp has been passed through the folds of the broad ligament and made to seize the fimbriated extremity of the left tube. The fimbriated extremity of the right tube has been transposed beneath the right broad ligament by a similar maneuver and is being lightly stitched in the bottom of the anterior culdesac.

abdominal wound. The fundus of the uterus is now brought forward under the lower angle of the abdominal wound. In making my original abdominal incision I took care to dissect the superficial fascia well back on both sides of the lower angle of

the wound. The skin is now retracted over this, and I place a linen mattress-suture through the abdominal wall into the uterus and out again. This passes from without inward and

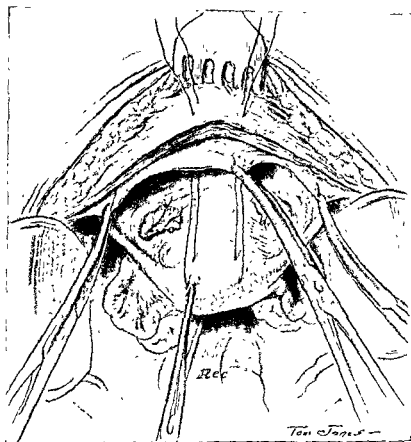


Fig 227 — Fimbriated extremities of both tubes stitched in the anterior cul-de-sac. The anterior retractor has been removed and the peritoneum grasped at one median and two lateral points and pulled up into the wound. The skin at the lower angle of the wound is pulled down with a hook retractor. A stout linen thread is then passed through fascia, muscle, and peritoneum into and through the uterine wall just inside of the round ligament and out again through peritoneum, muscle, and fascia. One of these is passed on either side, forming two mattress-sutures.

close to the median line through the superficial fascia, rectus, and peritoneum into the uterine wall, well up in the convexity of its fundus and then out again through the peritoneum, mus-

cle, and fascia I now pass a similar mattress suture just to the right of the median line (Fig 227) We will not tie these sutures, but merely secure them by forceps and leave them temporarily If I should tie these ligatures now I would have difficulty in accomplishing the next procedure The abdominal wall is now lifted well up with a broad flat retractor, and, beginning at the point where the left round ligament passes into the left inguinal canal, I stitch the round ligament to the anterior parietal peritoneum with a continuous iodine catgut suture This suture is carried down the entire length of the round ligament to its union with the fundus uteri I take pains to stitch through the ligament, not about it, and through the peritoneum into the inferior fascial sheath As I reach the fundus of the uterus my last stitch is an interlocked one to keep the suture from loosening The fundus of the uterus is adjusted forward so that the lower angle of the peritoneal incision is well above it With another iodine catgut I now begin at the right inguinal ring and stitch the round ligament in the same manner to the anterior parietal peritoneum on the right side Again when I reach the uterus I use an interlocked suture I now tie the two linen mattress sutures This brings the fundus of the uterus well up under the anterior parietal peritoneum (Fig 228) In order to finish the line of partition that I have made between the anterior culdesac and the rest of the peritoneal cavity, and at the same time to bury the linen sutures I now continue the catgut from the left side to the right that is from one round ligament to the other In other words I stitch across the uterine fundus and bring the line of peritonization well back over it between the tubal insertions so that the linen sutures will be excluded from the abdomen Next with a single light catgut over and over suture I close the hole in the broad ligament where the left tube was brought through into the anterior culdesac The hole on the right side is closed in a similar manner What I have done is this I have transposed the infundibulum of the tube beneath the round ligament into the anterior culdesac I have then closed the anterior culdesac by a transverse method of suspending the uterus, employing the round ligaments throughout their

entire length, from the inguinal ring on one side to the inguinal ring on the other (Fig. 229).

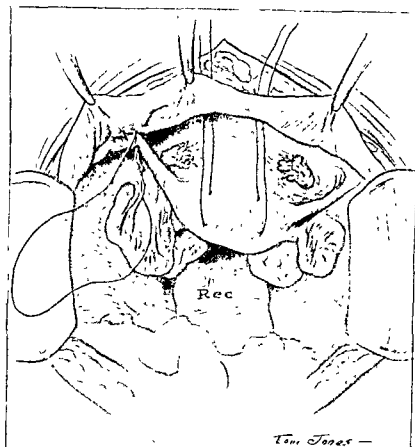


Fig 228—The two linen mattress-sutures are not tied, but merely held temporarily by forceps. With a light catgut thread the round ligament is now stitched to the anterior parietal peritoneum, commencing at the point where the round ligament enters the inguinal canal and stopping with an interlocked stitch where the round ligament joins the uterine wall. The opposite round ligament is treated in the same manner, beginning at the inguinal ring. The linen mattress-sutures are then tied.

This method of ventrosuspension is not new, but is one which I have used occasionally in fixation of the uterus after salpingectomy, and the after-results have been so favorable as to warrant its further application, as on this occasion. The advantages

of this procedure are that it is conservative, not requiring the extirpation of any structure or even the ligation of any large vessel. It avoids the anterior abdominal pillar formation, such

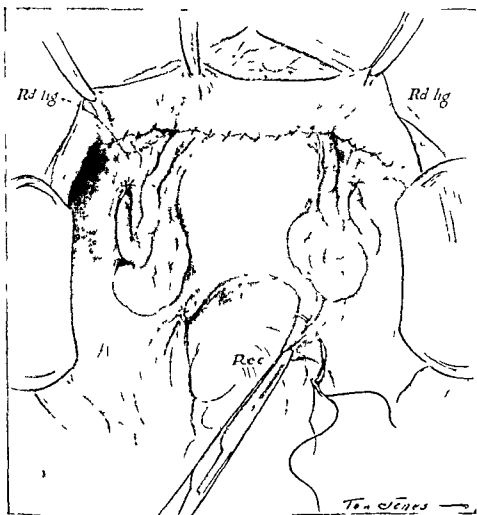


Fig 229—Operation completed. After tying the linen mattress sutures the anterior parietal peritoneum is stitched well down over the fundus of the uterus by continuing one of the continuous catgut sutures from its side to the opposite side. The two holes in the broad ligament through which the tubes were drawn are now lightly closed with a few stitches. This figure also shows a plication method of shortening the uterosacral ligaments.

as has been the objection in the Kelly suspension or Gilliam round ligament shortening or in certain methods of operating upon the fimbriated ends of the tubes. It affords an excellent suspension of the ovary, as you can see. It ensures drainage

of the tubes The anterior culdesac is left large enough to accommodate the bladder, so that there are no postoperative vesical disturbances It is a simple and effective operation, and may even be adapted to retrodisplacements of the uterus, as it gives an excellent fixation, especially if accompanied by a shortening of the uterosacral ligaments It is the best procedure so far suggested for the subsequent restoration of fertility. This would be accomplished readily by separating the adhesions along the line of ventrosuspension The tubes could be freed from the broad ligament or could be cut off close to the broad ligament and a cuff turned back, as was suggested originally by Martin I have performed this procedure twenty-five or more times for tuberculosis, nephritis, contracted pelvis, and valvular heart lesions, and I have associated it with repair of complete perineal lacerations and with high amputation of the cervix. It has even been made part of a conservative procedure for the cure of procidentia uteri, though I would not consider it adapted at all to cystocele or rectocele as such I have limited the procedure to patients who have had living children As a rule I have limited it to young women As far as restoration of fertility goes, I can only say that up to the present time there has been no occasion to attempt that.

Finally, I desire to call attention to one other feature of this operation, that is, the anesthetic This patient was anesthetized with ether, and the ether was continued until she was placed in the Trendelenburg position, the abdomen opened, and the intestines packed off. The ether was then taken away and nitrous oxid and oxygen were substituted The entire operation and the closure of the wound has been done, therefore, under nitrous oxid and oxygen The important thing in the use of gas in major operations as well as in minor is to avoid cyanosis This requires, of course, a trained anesthetist The patient, as a rule, is awake by the time she returns to her room. There is little or no postoperative gastric distress and our patients require less general postoperative care. As a rule there is no nausea or vomiting and no shock It has become my routine anesthetic for laparotomies I have used it now in 125 consecutive cases with such excellent results that I am encouraged to continue

CLINIC OF DR. ARTHUR H. CURTIS

ST. LUKE'S HOSPITAL

REMARKS ON SALPINGITIS

Summary Prophylaxis of salpingitis—vaginal douches in acute gonorrhea are pernicious, indications for operation, characteristics of appendicitis secondary to salpingitis which influence indications for operation, focal infection of the pelvic organs—fundus of the uterus rarely a chronic focus

It is well to retain uppermost in our minds certain clinical essentials which have been learned through hard experience. Most important of these in the prophylaxis of salpingitis is rest in bed, it is the best protection from this disaster and from other complications which beset patients with active gonococcal infection.

Other measures of much value include free elimination, regulation of diet, and judicious use of urinary antiseptics. A bland diet, with little meat and no seasoning except salt, helps much. Perhaps the most efficient of urinary antiseptics is urotropin in doses sufficient to yield a positive Rinini test for formalin. If more than 15 grains t i d are required to secure a positive test, another remedy should be given preference. In the presence of alkaline urine, combined urotropin and benzoic acid treatment do good service, the latter is administered in 5- or 10-grain capsules three or four times daily.

Treatment of the external genitalia during acute infection appears of little help in modifying the course of gonorrhea in women. On the contrary, manipulations sometimes force bacteria into the deeper tissues, prolong the course of the disease, and tend to spread infection.

The use of vaginal douches in acute gonorrhea is pernicious. Salpingitis in women who have refrained from douches is in-

frequent; such cases occur, but much less often. It is illogical to wash a pus-laden urethral discharge into the vaginal canal, as must occur with self-administered douche treatments. Again, in the process of douching the vaginal walls, the cervix, frequently the seat of infection, is flooded with solution; it must occur that gonococci washed into the vagina, or picked up from the vaginal portion of the cervix, are swept through the protective internal os up into the uterine cavity and beyond.

In quiescent and chronic gonococcal infections procedures aimed to eradicate the disease may be useful. But where pus or numerous bacteria persist we should meddle little, should shun the douche bag, and should remember the value of rest in bed aided by thorough elimination.

Indications for Operation.—Roughly estimated, 50 per cent. of patients with salpingitis progress to symptomatic recovery.

Of the remainder, one-half give history or yield physical evidence of residual pelvic lesions without disease sufficient to necessitate interference. The others require operation for relief.

Unquestionably, as time goes on, fewer of these patients will be operated. We can look toward the time when operation will be advised chiefly for two groups of cases: for complications, such as appendicitis and intestinal obstruction, and for the results of infection, notably adhesions.

Appendicitis Secondary to Salpingitis.—Here let us digress for a moment to consider appendicitis which complicates salpingitis. Not infrequently this causes the surgeon intense anxiety. It should rarely do so, for it seldom necessitates emergency operation.

If we think of the dangers in primary appendicitis we realize they are due to obstruction of the lumen or occlusion of vessels. The former leads to perforation or rupture, the latter to gangrene.

In the nature of things, appendicitis secondary to salpingitis develops without these emergency complications. The appendix is attacked *from without*, commonly near the tip at first. Distention of the distal end, from primary involvement of the mucosa, does not often occur. Likewise there is little tendency to obstruction of the circulation. Appendicitis secondary to

salpingitis, therefore, is rarely an emergency complication, and operation can be safely delayed until such time as is most suitable for the pelvic part of the work. Recognition of this point is imperative, it means removal of the chief temptation to open the abdomen of patients who suffer from acute pus tubes.

A Social Indication—In the clinic we encounter another indication for operation upon patients with tubal infection. It is the presence of financial difficulties. These cases often cannot afford to remain long idle, nor can they withstand the expense of prolonged medical care. They overdo or overindulge before complete recovery, and recurrence follows. To prevent this frequent course and to stop the promiscuous spread of venereal disease by such patients we operate many of the more severely infected ones upon subsidence of acute symptoms. It is a social necessity which forces an operative interference otherwise avoidable or capable of postponement.

Notes on Focal Infection—To the enumerated classes which require operation we may add a final group. These are the patients with chronic focal infections of the pelvic organs, the presence of which gives rise to recurrent systemic disorders. These exist, but my present thought (gonorrheal arthritis excepted) is that they are infrequent.

Now in the ward under observation is a patient with deforming arthritis. In addition to her misshapen joints there is an enlarged spleen. She has a profound anemia. History, physical examination, symptoms, all suggestive clues have yielded our internists nothing in addition to a complaint of purulent vaginal discharge and pelvic distress. We find the left Bartholin gland enlarged. Skene's ducts are thickened, but yield no gonococci on stripping. Two vaginal examinations showed no pus, but upon a third occasion a gush of foul purulent discharge poured from the vulva. Its origin, as yet uncertain, was probably a Bartholin gland. The uterosacral ligaments are shortened, rigid, and tender, the well placed uterus of normal size, its cavity free from pus and bacteria. Tubes and ovaries are negative. In the discharge is much pus and bacteria with Gram positive diplococci most abundant. This patient, with chronic infectious arthritis,

anemia, and large spleen, in whom repeated efforts fail to disclose history or symptoms of infection elsewhere, requires removal of her diseased pelvic tissues.

There is a second case of this kind which I have recently seen. The wife of a doctor, a patient of Dr. Watkins, suffered from a non-gonorrheal, offensive, profuse discharge of pus which had poured from the vagina for years. The patient's health became greatly undermined. No source of pus formation could be found in the external genitals. The uterus and tubes were removed, but yielded neither pus nor bacteria upon most painstaking study.

In making mention of these two cases I wish to avoid emphasis of the pelvic organs as centers from which systemic troubles arise. Gonorrheal arthritis excepted, I suspect the pelvic tissues of women do not often harbor active focal infections.

Focal Infection in the Uterus.—The frequency with which infection lodges in the endometrium is worthy of more thought and study than has been accorded it. The endometrium is a supposed hot-bed of infection. It is treated, scraped, and irrigated. Many gynecologists curet before plastic operations to prevent outpouring of infectious uterine material over the fresh wound surface. Almost all fear infection from the uterine cavity after hysterectomy; the cervix is therefore iodized or cauterized. Just now there is also an increasing tendency to remove the uterus in attempts to cure disease in distant regions.

My belief is that the endometrium has wonderful recuperative powers. Infection persists in it probably a shorter time than in almost any other tissue. Infection is likely if the uterus has been packed, also in complications at the cervix, such as senile obstruction, carcinoma of the cervix, or fibroids presenting at the external os. Otherwise the endometrium remains clean. It is normally uninfected and is wonderfully capable of throwing off infection. The rule of afebrile recovery after labor, when uninfluenced by vaginal examination, speaks for this.

I have now made a large number of examinations of the endometrium after hysterectomy for various causes. In smears, in cultures from the surface, and cultures of the entire endo-

metrium ground bacteria are not often present, when found they are scarce and scattered

It is doubtful whether chronic infection of the uterine fundus, in the presence of free cervical drainage, is responsible for systemic disturbances except in most rare instances, as a center for local infection I believe it may well be almost disregarded Whether the same holds true of the cervix is still open to question

CLINIC OF DR. N. SPROAT HEANEY

PRESBYTERIAN HOSPITAL

V-SHAPED HYSTERECTOMY FOR DYSMENORRHEA AND LEUKORRHEA

Summary A patient with membranous dysmenorrhea and associated leukorrhea, pathology of menstruation, and hysterectomy objectionable because of the production of artificial climacterium, indications for V-shaped excision of the uterus, technique of the operation.

February 20, 1917

THE patient I wish to present to you this morning is a married woman, twenty-five years old, who comes to us for relief from dysmenorrhea and leukorrhea. She has been married eight years and has never become pregnant. She began to menstruate at fourteen. The periods are regular, every twenty-eight days, lasting for five days, and are very profuse. The patient has pain beginning one hour after the onset of menstruation and lasting the entire period. The severity of the pain is such that the patient is confined to bed always for two whole days, and has to use opiates to obtain relief, and cannot work for one week out of each four. The first menstrual period at fourteen was painless. Since that time each menstrual period has been painful and the pains increase as time goes on. The pain at the menstrual period is paroxysmal and colicky in character, and is accompanied by the discharge of pieces of membrane from the uterus. She was operated upon by someone else three years ago, at which time the cervix was dilated, the uterus curetted, and an operation performed for retroflexion of the uterus. She obtained some relief for two or three periods, and then the pain became as bad as before. The leukorrhea has been persistent for an equal length of time. It is profuse and requires the

constant wearing of a napkin. The onset was gradual and did not begin with an acute history of infection. The patient at no time has had any acute abdominal symptoms associated with fever.

How do we interpret this dysmenorrhea? The persistence of the pain and the discharge of the membrane leads us to the diagnosis of membranous dysmenorrhea. She was comparatively relieved for a short time three years ago after the operation. This can be attributed to the dilated condition of the cervix. However, this was but transitory, and as soon as the cervix returned to its former size the dysmenorrhea was as bad as ever. We are dealing with a very stubborn affection, and one where we have no hope of relief by conservative procedures. During the course of the month the exudate forms in the endometrium, and at the onset of the menstrual period the endometrium loosens and becomes separated from the uterus, and then the uterus has to give birth to this membrane the same as in pregnancy. The passage of the membrane is what produces the severe pain. No medication has yet been found which gives relief.

What operative procedures are open to us? Dilatation and curetment chronically fail. The only measure which promises relief is the ablation of the menstrual period itself. Now the question arises as to how this may be done. How may we prevent this patient from menstruating and consequently remove this pain? Menstruation may be stopped by removal of the ovaries. If the ovaries are not present the patient will not menstruate, but as a result of this we produce an artificial climacterium with its attendant phenomena. The menses may be stopped by removal of the uterus, leaving the appendages behind. If we do a hysterectomy according to the usual technic, we tie off the uterine artery and its accompanying veins and thereby disturb the blood-supply of the ovaries, with the result that the ovaries undergo change, so that we can expect that within a very short time after the ordinary hysterectomy the patient will begin to enter the artificial climacterium. Is there some other means that we can employ to prevent menstruation and yet guard against the atrophic changes

above mentioned? The part that produces the exudate, the part of the uterus that takes part in menstruation, is the endometrium itself. If the endometrium can be so thoroughly removed that none of it is left to undergo the peculiar changes of menstruation, then we can prevent this patient from menstruating. This may be done by a V-shaped excision of the uterus. In this procedure we cut out sufficient of the uterus from the fundus down to the cervix to remove all of the endometrium and then sew the two lateral flaps together. This prevents the patient from menstruating, and, in consequence, cures the patient of her dysmenorrhea. The uterine vessels are left undisturbed, as are the ovarian, and, in consequence, the ovaries remain unaffected and will last and functionate as long as they otherwise would. As a result of this operation our patient, of course, will be sterile, but she is already sterile. She has been married eight years and has never become pregnant. It is the tendency in membranous dysmenorrhea for the patient to be sterile. All the effect that this operation will have after her recovery is simply that she will fail to menstruate. Otherwise she will deport herself as normal.

Now the leukorrhea is produced by the cervix. If the membranous dysmenorrhea were the only thing to be relieved in this case we would excise only to the level of the internal os, but since we have also the leukorrhea to cure we may excise the uterus through its entire length, removing the cervical canal as well.

This same operation is the operation of choice in treating idiopathic uterine hemorrhage. It is the operation of choice in treating fibroids of the uterus, especially in younger individuals which otherwise would necessitate a hysterectomy. A young individual with a fibroid producing marked bleeding can be operated upon in this way, and either no endometrium left or many times sufficient endometrium left to produce a slight flow at the menstrual time. In this way, by avoiding a complete removal of the uterus in a young individual, we avoid disturbing the blood-supply of the ovaries and the consequent artificial climacterium.

OPERATION

We will make the usual median incision, opening up one belly of the rectus muscle, and then by dissection find the opposite belly of the rectus and open it up (Fig. 230). This will ensure a better closure and a stronger wall. As a result of the previous operation we have a considerable number of omental adhesions to our incision, which we must dispose of by folding the omentum on itself and stitching so as to prevent extensive adhesions after this operation.

Having now prepared our field, we will do our operation in the following way: First we catch each uterine horn with a bullet forceps and exert slight traction upward. Since we are here going to remove the gland-bearing part of the cervix as well as the functioning part of the uterus, we must prepare the bladder area as our next step. I grasp the peritoneum at the plica vesico-uterina with my tissue forceps, and, making it taut, I make a transverse incision the width of the uterus itself at this location, just above the plica. Then with the gauze-covered finger I gently shove the bladder downward and dislocate it from the uterus. The bladder separates very easily you see (Fig. 230, 2). Now, with the bladder out of the way, I seize the fundus of the uterus with a third bullet forceps, and taking a large scalpel I begin at the left uterine horn and cut parallel to the side of the uterus about $\frac{1}{2}$ cm. away from its border down through the body and the cervix until I now have opened up the vagina. The patient was, of course, prepared vaginally before operation. You see there is some bleeding. If at all brisk, the bleeding can be controlled by biting the uterus with bullet forceps. I now examine to see that no endometrium-bearing part has been left on this side, for if so, these endometrial islands may undergo menstrual reaction, and there being no escape, more pain may be the result than if no operation had been performed. The inspection being satisfactory, I now begin at the right horn and cut downward $\frac{1}{2}$ cm. from this side of the uterus until I again cut into the vaginal vault (Fig. 230).

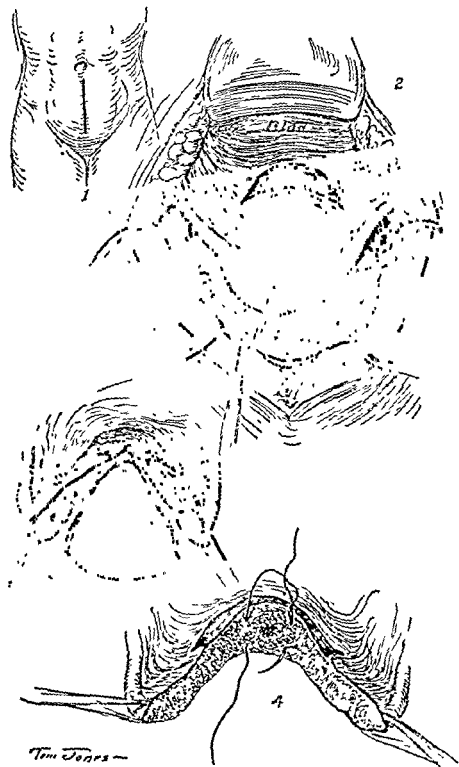


Fig 230 —V-shaped hysterectomy 1, Line of incision; 2, separation of bladder so as to allow excision of cervical canal when necessary; 3, excision of the endometrium-bearing portion of uterus, 4, continuous muscle suture.

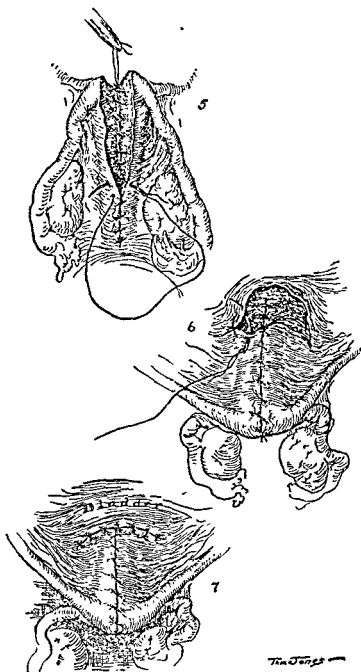


Fig 231.

This triangular portion of the uterus which I have removed contains the endometrium and the cervical canal. I now have a small flap of uterine muscle on each side. I will draw these together in the midline by sewing the flaps together. For this I use a continuous suture of iodine catgut (Fig 230) and, beginning at the lower end of the posterior wall I close first of all the vaginal vault, and then go upward, coapting first the myometrium of the posterior wall up until the horns are united. I then coapt the peritoneum of the posterior surface. You will find it easier to sew the posterior surfaces together first and the anterior surfaces afterward. I now close the anterior side. You note that I close in layers of sutures first the myometrium then the perimetrium posteriorly and anteriorly, and that I strive to make accurate coaptation (Fig 231). *The sutures must not be drawn too tightly.* I now bring up the bladder to its previous location by sewing up the transverse incision just above the plica vesico uterina by a continuous suture (Fig 231). Now that our operation is completed, you see we have a small central body about the length and diameter of your thumb—a diminutive uterus without menstrual or cervical secretory function (Fig 231). We have two normal sets of appendages tubes and ovaries and since neither the uterine, communicating uterine nor ovarian have been cut or tied their blood supply is just as it was previous to the operation. This patient will not be able to menstruate and therefore will be free from the invaliding dysmenorrhea. This operation is free from all danger to the ureters also since they are well out of the field in which the work is done.

Fig 231—V-shaped hysterectomy 5 Peritoneal closure. The muscles having been brought together by a continuous suture one anterior the other posterior 6 bringing the bladder back to its former location by a continuous suture of the peritoneum 7 operation completed. View looking downward on anterior surface of uterus which is held back.

CLINIC OF DR CHARLES A PARKER

COOK COUNTY HOSPITAL

THE TREATMENT OF BURNS WITH SPECIAL REFERENCE TO THE PREVENTION OF DEFORMITIES

Summary Two cases illustrating the use of adhesive plaster strips applied directly to the granulating surface after the separation of the sloughs and the use of effective apparatus to maintain the parts in such a position during healing that the resulting cicatrix will cause no deformity or limitation of motion

CASE I - This patient J K was admitted to the hospital on the service of Dr Dyas on the 20th of February 1917 suffering from a severe kerosene burn of the left side front and right side of the neck extending up on to both cheeks and ears (Figs 232 and 233)

It is through the courtesy of Dr Dyas that I present him to you in this clinic

He has received the open air treatment for a month and his neck and parts of his face and ears are covered with thick foul smelling crusts. The burn is more extensive on the front and left side of the neck and face than on the right and he is at present able to hold his head fairly erect although it is an effort for him to bend his head to the right away from the left shoulder. Beginning contractures are already in evidence and if allowed to continue this patient is surely destined to develop enormous disfigurement with scar tissue drawing the chin toward the sternum and the head toward the left shoulder. The deforming action of burns in this locality is so well known to medical men as to need no further comment.

This deforming action can be and therefore must be absolutely prevented. The wound is first cleaned from crusts as well as possible best with moist dressings of plain sterile water and

material extending up over the top of the head. Around this is wound sheet-wadding in several layers, covering the head, neck, and shoulder, quite regardless of the future shape of the trimmed cast. A bandage holds this wadding in place, and the plaster bandages are then put on until a thickness that one feels will be sufficient to maintain the desired position is obtained. During its application the patient's head must be held by an assistant in the overcorrected position. After the plaster is set and while it is still moist it is trimmed with a sharp knife to the desired shape. The excess of stockinette from above and from below is now folded over the outer surface of the cast and all parts sewed together, thus giving a nice finish and pleasing aspect to an apparatus that must be worn for a considerable length of time. The cut on the right, or narrow side, allows easy removal and replacement. When it is soiled from discharges it should be wiped as dry as possible and put in the sun to dry or be thickly coated with talcum powder. If properly made it will last many months. The patient learns to depend upon it and never suffers the torture entailed by accidental movements of the head or the physical exhaustion which follows from constantly guarding his injury with tense muscles.

The Dressing—The adhesive plaster dressing is by far the best method proposed up to the present time for the treatment of the granulating area in burns. It is in no way a substitute for skin-grafting, but in all areas where grafting is impracticable or impossible it has no equal. Its action is mechanical. It flattens down granulations on convex surfaces so the epithelium has no trouble extending over them, it retains the heat and moisture, both absolutely essential to cell-life and growth, and furnishes an impermeable covering under which the epidermis can creep along and into which no granulations can extend to be torn loose at each removal, as in dressings of gauze. It does not stick to the wet surface, therefore its removal is bloodless and painless except for its adhesion to the good marginal skin. Its application with some tension to press down the granulations is equally painless. The retention of secretions is no fault, a scab does the same if it is good and efficient, and besides, the

plaster, by its pressure, reduces osmosis and thus wound secretion to a minimum. To be sure, a certain amount of pus will be found under the plaster when it is removed, but it is the best fluid the infected tissues—and all burns early become infected—have to grow in, so its presence as fluid is not to be feared. The plaster should be reapplied whenever it becomes loosened at the edges. This may be twice a week or sometimes daily when there is considerable movement in the part, as about the face. The surface should never be allowed to become dry.



Fig. 237—September 24, 1913, showing the extent of burn. (From the Jour Amer Med Assoc, July 3, 1915, Marguerite Children's Memorial Hospital.)

The gauze dressings should be changed every day as they become soiled. As they do not touch the wound, their removal and application is entirely without discomfort. The wound should never be touched with solutions of any kind, antiseptic or otherwise. It is a surgical crime to apply antiseptics to these surfaces. There is no fluid so well adapted to them as the patient's own serum.

Here are photographs of a case I treated about a year ago and which I described in the Journal of the American Medical

Association, July 3, 1915. These photographs illustrate a method of preventing deformities in burns of the chest and arm (Figs. 237 and 238). The apparatus is removable. The first indication in the treatment of a burn on the flexor surface of a joint is to hold the joint in extension during healing.

I have made the statement that "in all burns of the limbs and their connections with the body that leave the deep structures intact and ready to resume their function after the surface is healed, as long as such burns are compatible with life, healing may and should be obtained without deformity and with good



Fig. 238—October 18, 1913, showing completed dressing with removable plaster-of-Paris splint (From the Jour Amer Med Assoc, July 3, 1915, Marguerite, Children's Memorial Hospital)

function." If this is true, and I am convinced that it is, the cruel deformities of the limbs we now so frequently see must become more and more infrequent until their occurrence will be considered a distinct reproach to the one responsible for the care of the patient during the period when prevention was possible.

Regarding the open-air treatment of burns:

The best thing that can be said for the open-air treatment of burns is that it is better than some very poor treatments. It was a reaction from the many vicious treatments by antiseptics, frequent changes of gauze dressings, drying powders, and other

abuses. It was much more comfortable and removed the curse from the physician and put it on Dame Nature. It is very acceptable in areas where it is difficult to apply any dressing, although such areas must be of very limited extent. It is an extremely expensive dressing in the demands it makes on the body for protection. The scab is made of dried serum, bacteria, and body cells, and is only efficient as a healing agent when it has become so impervious as to keep the growing parts warm and moist. This is the normal healing under a scab, but in large areas

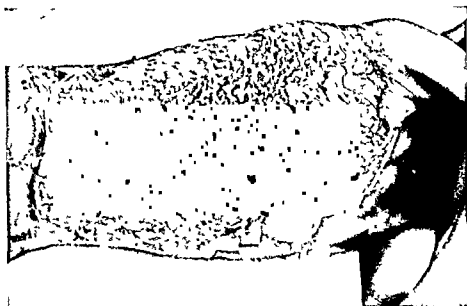


Fig. 239—Boy, aged seven years. Extensive burn of the body after the slough has separated.

the scab is so frequently broken that new serum and living cells must again and again be dried to maintain the necessary moisture for the growth underneath. Every drying kills more cells. Besides this, the accumulated crusts harbor saprophytes, causing decomposition, disagreeable odors, and irritating compounds that delay healing. Healing is slow, but may eventually occur with the maximum amount of scar-tissue and the greatest possible deformity. It has been found woefully wanting, and the sooner and wider this is known the better it will be for the sufferers from burns.

CASE II.—This boy is seven years of age. Three weeks ago he was brought to the hospital with a severe burn involving the entire right side of the chest and abdomen from the axilla to a line at about the level of the great trochanter of the femur. As you see him today you note that the wound is relatively clean,



Fig. 240—Same as Fig. 239 showing adhesive plaster strips in place.

the sloughs have all separated, and there is an abundance of healthy granulations (Fig. 239). We dress this case with strips of adhesive according to the plan I have just outlined (Fig. 240). The size of a burn does not materially modify the value of adhesive plaster dressing

CLINIC OF DR. KELLOGG SPEED

COOK COUNTY HOSPITAL

MEDIASTINAL TUMOR PROBABLY ORIGINATING IN THE THYMUS GLAND: ASSOCIATED THYROID ENLARGEMENT

Summary A patient complaining of dyspnea, dizziness, and substernal pain, with cough and rapid loss of weight, the physical signs, diagnosis of mediastinal tumor—the clinical course in this patient, the thymus gland, its origin and function, pathologic basis of thymic disturbances, tumors of the thymus

CASE HISTORY

Two months before this man's admission to the hospital—that is, about three months ago—he fell asleep before an open window and awakened with a chill and cough. His occupation was that of a cook, his age twenty-five years, and he claimed that his health had previously been satisfactory.

His previous history was of interest inasmuch as up to the age of fifteen he had suffered from a croupy cough each winter. Some five years ago he had an infected finger with an axillary abscess from which he made an uneventful recovery. There were several diseases of childhood, dates and names forgotten, except typhoid at the age of nine. He had had no venereal infection. The family history is entirely negative, and the only untoward habit was the use of alcohol very freely in the shape of whisky, for which he sometimes substituted 50 per cent. alcohol.

A year ago he was seized with severe pain in the front of his chest, which he described as a feeling that might have been caused by an ice-pick being driven into him. His agony was supreme, so that he could not straighten up at all, and since then, on an average of once a week, these lancinating pains in the chest have returned for about a minute's duration. After

the chill mentioned, which he really considered as the onset of his sickness, his cough had been almost continuous and was very productive. There were also night-sweats, and he remarked that his neck began to swell and his eyes to bulge. At first, in the midline of the neck in the thyroid region, there had been a red area and some swelling of the lower jaw and face. This rapidly subsided, but the thyroid swelling progressively enlarged. Dyspnea and dizziness appeared, and two weeks before entrance a lump appeared to the left of the sternum which soon reached the size of an egg. Heart action became slightly irregular, hoarseness appeared, and in the last few months he had lost 15 pounds, which he attributed to worry because he feared the chest pains were caused by some heart disease.

Physical Examination.—The patient is a well-developed male, coughing frequently, with resulting marked venous congestion of the face and neck. Mild exophthalmos is present, but the upper lid follows the eyeball down readily. Pupils are negative. The lower half of the front of the neck is enlarged anteriorly and laterally (Fig 241). This enlargement is indurated, but ceases abruptly above the suprasternal notch and moves on swallowing, apparently representing the middle lobe of the thyroid. Laterally the mass in the neck does not move so freely and seems to be fused with the masses projecting from behind the sternum and beneath the left clavicle. All superficial veins in the neck are enlarged, but no pulsations, thrills, bruit, or tracheal tug are found.

The chest shows the deep-seated, fixed, egg-sized tumor to the left of the sternum in the second interspace. Over it the skin moves freely and the superficial veins are dilated, particularly over the left chest. On the right side inspiratory expansion is reduced. No apex-beat is visible. Palpation fails to locate any thrills, but there is increased tactile fremitus over the upper chest anteriorly, especially on the left side, with dulness extending 3 inches on both sides of the sternum at the level of the second rib. This dulness extends downward, symmetrically widening, until at the fifth rib level it is 5 inches in extent from the sternum. Over the right middle

lobe of the lung there is bronchovesicular breathing and crep-
 itant râles in the right midclavicular line Over the cardiac
 area can be heard a soft systolic blow transmitted toward the

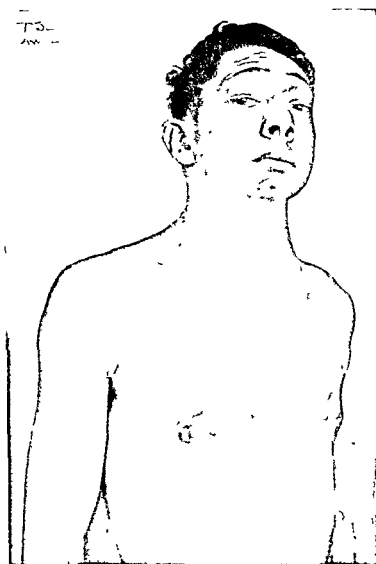


Fig. 241.—The enlargement of the base of the neck laterally and in the region of the isthmus of the thyroid is well shown. Note the engorgement of the external jugular vein and its branches.

axilla from the apex. No other physical findings of importance are present.

The laboratory findings are as follows. Wassermann is

negative. No tubercle bacilli are found in the sputum after several examinations. The blood showed October 10, 1916, 4,400,000 red blood corpuscles, 13,200 white cells, the differential examination of which gave 7 per cent. small mononuclear; 4 per cent large mononuclear; 86 per cent polymorphonuclear; 1 per cent. eosinophils; 2 per cent. transitional; 80 per cent. hemoglobin. This count gradually decreased, reaching 3,700,000 red blood-corpuscles and 14,000 white blood-corpuscles, with 75 per cent. hemoglobin early in November

On October 29th flatness appeared in the left chest, extending downward from an inch above the inferior scapular angle. There was increased venous stasis in the neck and chest and the lateral enlargement of the chest tumor rapidly advanced, so that the left supraclavicular fossa became obliterated (probable involvement of the pleura) Nodules appeared in this mass Chest examination gave unaltered signs. Paracentesis of the chest gave a straw-colored fluid containing many polymorphonuclear leukocytes, but no bacteria The next day a small gland was removed from the left side of the neck, which on section showed a typical diffuse lymphosarcomatous process.

A roentgenogram (Fig 242) showed very large rounded and lobulated shadows, extending laterally from the mediastinal shadow These shadows are rather characteristic of sarcomatous change because they are rounded and smooth with scalloped-like edges Carcinoma shadow differs by being stellate and more finger-like in its projections Carcinoma we also expect to start in the hilum of the lung, so that a shadow originating in the mediastinum, as this plainly does, suggests another type of tumor. All indications pointed toward mediastinal origin

Summary of Clinical Course —The temperature on admission was 99.2° F., but fell to normal, rising only twice above that level and then never over 99.6° F. Heart action was quite rapid at first, 112 per minute, but with rest this fell as low as 80, averaging 96 for the period of hospital stay Respirations varied between 20 and 24 per minute Iodids and mercurial rubs were instituted, and no cough sedative was necessary until

three weeks after entrance, but then even large doses of codein were of little avail. Sleep was satisfactory up to sixteen days after admission. At that time he awakened in a dyspneic attack with cyanosis, and his condition failed rather rapidly thereafter. Loss of weight was particularly noticeable.

Feeling that operative interference could offer no hope, and that the rapid progress of the pressure and other untoward

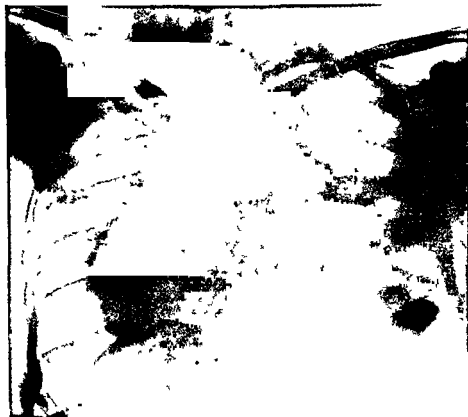


Fig. 242—Roentgenogram of chest showing massive involvement of the mediastinum

symptoms meant an early exitus, he was advised to go to his home in Pennsylvania. He left early in November and we were informed that he passed away two days after arrival. While we regretted the lost opportunity for postmortem examination of this interesting tumor, we felt compelled to advise him as we did.

REMARKS

The interest in this unfortunate patient lies in the diagnosis, because surgical interference at the time when he was first seen was contra-indicated. An incomplete or hasty examination, especially without the aid of the roentgenogram, would lead the surgeon to consider the disease one of thyroid disturbance with a large neck tumor and some symptoms of hyperthyroidism. Bulging from behind the sternum from the anterior mediastinal space draws attention to the frequently forgotten thymus, and we considered that source of his trouble at once. Aberrant thyroids or parathyroids were also considered because they have both been found as tumors of this space. The close clinical connection, however, between the mediastinal tumor and the rapid recent enlargement of the thyroid rather settled us upon a diagnosis of primary sarcoma of the thymus, which may have been persistent, with secondary involvement of the thyroid, the cervical lymphatics, pleura, and both lungs. Because tumors of the thymus are unusual and easily overlooked, I would direct your attention again to this organ.

Thymus: Origin, Development, and Tumors.—Our meager knowledge of this body shows its probable origin from the third and fourth branchial clefts. At birth it is nearly at its greatest size, progressing for an average period of two years, when it is found to fill the space from the thyroid to the pericardium. It may increase in size after this age, but generally it begins to retrogress, and at puberty has disappeared into a thin network of fibrous tissue and fat. Remnants are, however, found in elderly individuals. In its two flat lobes which lie upon the trachea we find two classes of cells—epithelial elements in the reticulum and the thymic cells proper or lymphocytes (Mayo Clinics, 1912). Both the thymus and thyroid are branchiogenic, and with a closely associated blood-supply one easily believes that mutual disturbances or tumors of the two glands may be common. There is found an enlarged or persistent thymus with goiter, but not frequently. Physiologically, some observers have found that extracts of thymus accelerate the pulse-rate and lower the blood-pressure, and after thymectomy puppies become

fat and lazy and they are subject to spontaneous fractures. The long bones show an interference with their calcium balance and osteoporosis with cartilage overgrowth appears. Chemical analysis of dried bones from thymectomized animals shows a great deficiency in calcium, amounting to one half the normal content. After thymectomy also the thyroid tends to take on an increased weight.

For clinical purposes we may divide the thymic disturbances on a pathologic basis of (1) absence, (2) simple persistence, (3) hypertrophy and hyperplasia, (4) acute inflammations, resulting particularly from infectious diseases of childhood, (5) various disturbances caused by overexertion starvation, or circulatory changes, (6) tuberculosis and syphilis, and (7) tumors.

Mayo states that in 350 autopsies the thymus was found luetic in over 3 per cent. *Dubois' abscess*, a collection of yellow drops in the cellular tissue of a normal gland and not a true abscess, is also found. Our patient gave some evidence of a persistent thymus, inasmuch as he had coughed all his adolescence in the cold weather. His diseases of childhood may have attacked the persistent thymus, caused its greater enlargement, or eventually aided irritation which set up the overgrowth. Thymic tumors are of slow growth and usually are late in manifesting themselves, so that they are confused with the thyroid or other neighboring structures. They do tend to metastasize freely, especially in the regional lymph glands pleura lungs and kidney, spleen and pancreas, but do not attack the bones like thyroid tumors. On account of the gland structure carcinoma is rare. Sarcoma (lymphosarcoma) or mixed cell tumors are those usually found. A few instances of cysts or lipomata of the gland are recorded.

This patient had no evidence of status thymicolymphaticus until the onset of his terminal sickness. There were no genital changes or skin pigmentation and his weakness and dizziness with the rapid pulse came on suddenly but a few weeks before exitus. The thyroid enlargement was also of sudden origin and is, I believe, an instance of metastasis from the thymus.

to the thyroid coupled with some circulatory stasis. Metastases of malignant tumors to the thyroid are rare, although in status lymphaticus it is claimed that one-half of the patients show an enlarged thyroid, but the connection between persistent thymus and goiter has not yet been proved scientifically.

Let me emphasize again the necessity for careful scrutiny of all thyroid tumors of sudden origin, a thorough physical examination of the chest for dulness in the upper sternal region, a search in the history for evidence of possible thymus persistence, and a roentgenogram of the thorax. When mediastinal tumors in adults have progressed to the point of external appearance around the sternum and regional glandular involvement is at hand, operation is contra-indicated, and the decision is always backed up by the roentgen-ray examination.

CLINIC OF DR. GEORGE G DAVIS

PRESBYTERIAN HOSPITAL

CURE FOR HALLUS VALGUS: THE INTERDIGITAL INCISION

Summary: Deformity of the foot resulting from a primary injury augmented by foci of chronic infection in other parts of the body, classical picture of hallux valgus—points of difference in this case, technic of the operative cure.

Mr. T. H., of Iowa, comes to the clinic complaining of pain in the right foot and inability to walk or put weight on the foot on account of this pain.

The patient, who is thirty-nine years old, states that twenty-eight years ago a counter fell on his right foot and he was so severely injured that he could not walk for four or five months. Shortly after this he noted that the third toe was crooked—that is, it was in a flexed condition—but the foot at this time did not cause him much inconvenience. In 1903, 1907, and 1912 the patient suffered from attacks of rheumatism. During these attacks the foot in the region of the metatarsophalangeal joints became swollen and quite painful, and for the last four years walking has constantly been painful. Two years ago a callus developed on the ball of the foot. The pain is particularly acute at this point when the patient is walking or places the weight of his body on the foot. There is, however, no pain when the patient is not walking and the body weight is off the foot. These symptoms have been gradually increasing, the pain becoming greater and the deformity more marked.

Other points in the history which may have a bearing on the present condition are as follows: The patient has had attacks of tonsillitis two or three times a year for many years. He had malaria fifteen years ago when he was a soldier in the Philippine

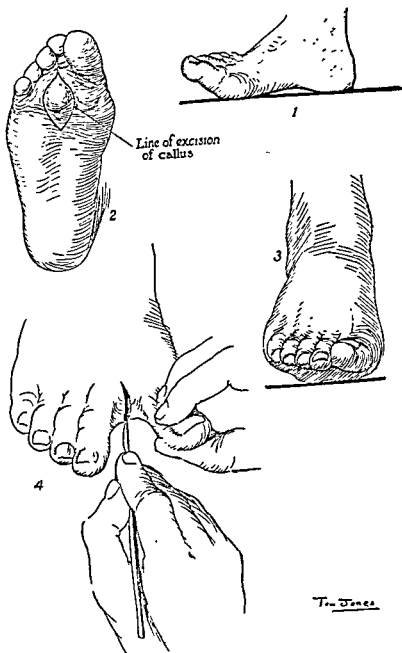
Tom Jones

Fig. 243

Islands, and a gonorrheal infection ten years ago. The patient denies ever having worn tight or pointed toe shoes.

On examination of the local trouble what do we find? First we note that when the patient stands none of the toes touch the floor (Fig 243 1 3). They are all hyperextended and are all free of the floor. Again we note that they are all in the valgus position, *e g* they deviate from the mid line of the body. On the plantar surface about the middle of the ball of the foot is a callus which is $\frac{3}{4}$ inch in diameter (Fig 243 2). On palpation the head of the third metatarsal bone is felt to protrude at the site of the callus and pressure here causes exquisite tenderness. We have requested roentgen ray examination of the foot in two views anteroposterior and lateral. In the anteroposterior view (Fig 244) we note that the big toe and the second third and fourth toes all deviate laterally. We also note that the heads of the first second third and fourth metatarsal bones are markedly enlarged especially on the median and plantar aspect. The third point to note in the plate is the hyperextended position of the first phalanges of the second third and fourth toes. The lateral view (Fig 245) shows the toes in a hyperextended position and there is a semi dislocation of the first phalanx at the metatarsophalangeal joint.

We may best classify this group of symptoms under the title 'hallux valgus,' but it certainly may be questioned whether this entire group of symptoms is secondary to the hallux valgus or whether it seems more likely the condition of the other toes is not rather the result of a process in the metatarsophalangeal joint of the second third and fourth toes similar to that in the metatarsophalangeal joint of the big toe. The classical picture of the advanced sequences of hallux valgus are not noted here. The toes are not huddled together or overlapping yet we note

Fig 243—1 Lateral view of deformity. Note the elevation of the toes which are free from the floor. 2 Plantar view. Note the hallux valgus and the callus on the ball of foot caused by protrusion of the head of the third metatarsal bone also the extension of incision from the web between second and third toes downward to encircle the callus. 3 Lateral view. Hallux valgus and hyperextension of first phalanges causing the toes to be free from the floor. 4 Incision being made in web between toes for approach to the head of the first and second metatarsal bones.

the characteristic type of hammer-toe as the first phalanx of the second and third toes are *hyperextended* and the second and third phalanges are flexed.



Fig 244 —Roentgenogram showing the enlargement of the heads of the first, second, third, and fourth metatarsal bones, especially on the median and plantar aspects, causing a lateral and upward displacement of the corresponding phalanges

The patient gives no history of ever having worn tight or pointed-toe shoes. The factors which may have played a rôle in this case are trauma and focal infection. The trauma may

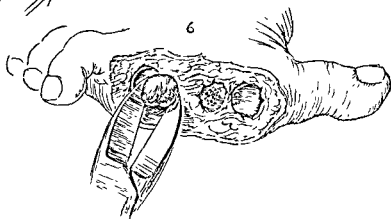
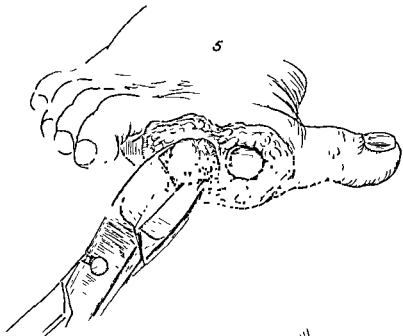
have played a double part, first by the injury per se and second by causing a locus minoris resistentiæ for the focal infection. The two possible sources of the focal infection are the tonsils which have been frequently inflamed, and the parts of the



Fig 245 —Roentgenogram showing the first phalanges in hyperextension with flexion of the second and third phalanges of the second third and fourth toes (hammer toe)

genito urinary system which may have been invaded in his gonorrheal infection most probably the prostate.

The pathologic conditions here, which must be considered from the standpoint of surgical treatment, are various. There is a chronic arthritis of the metatarsophalangeal joints with an



enlargement, especially of the median and plantar surfaces of the heads of the metatarsal bones. It is this enlargement probably which causes the outward and upward displacement, making a semidislocation of the first phalanx rather than the muscular traction, as is frequently stated. A contracture and shortening of the plantar fascia prolongation on either side of the phalanges assist in the hammer-toe formation. The callus on the ball of the foot, resulting from pressure on the head of the third metatarsal, must also be dealt with surgically.

The pathologic conditions here have progressed too far to be cured by such palliative measures as the wearing of correctly shaped shoes or wearing metal partitions attached to the sole of shoe, projecting between the first and second toes. Therefore we shall take surgical measures to cope with the various pathologic conditions; we shall remove the head of the metatarsal, cut the shortened plantar fascia prolongations, remove the callus, and mold the toes in their normal position

OPERATION

First we make in the web between the first and second toes an incision (Fig. 243, 4), through which the head of the first metatarsal bone may be dislocated after the capsule of the joint has been opened (Fig 246, 5) The enlarged part of the head of the first metatarsal is now nipped off with a bone-cutting forceps in an oblique direction, taking more off on the median aspect of the bone than on the lateral (Fig 246, 6), that the hallux may be straightened or slightly overcorrected The lateral

Fig 246—5 The hallux has been dislocated medianward, exposing the smooth articular surface of the base of the first phalanx and the head of the first metatarsal, which is to be removed by bone cutting forceps. 6 The hallux is in forced adduction. The cut surface of the first metatarsal, the smooth surface of base of first phalanx, and, to the left, the head of the second metatarsal about to be removed by bone cutting forceps are well shown. Under the left blade of the forceps is seen the articular surface of base of first phalanx of second toe. 7 The articular surface of the base of the first phalanx of the big toe is seen on the right. Two pairs of stitches have been inserted, bringing capsule, fat, and connective tissue over the cut surfaces of the first and second metatarsal bones. On the left is seen the smooth articular surface of the base of the first phalanx of the second toe

phalangeal prolongations of the plantar fascia are further divided and freed. A portion of the capsule, subcutaneous fat, and connective tissue is turned in over the cut surface of the metatarsal bone to form a new joint (Fig. 246, 7). After the first metatarsal bone has been thus cared for, the second metatarsal bone is dealt with in a similar manner through the same skin incision, which will now be closed with interrupted sutures. To approach the head of the third metatarsal bone and to deal with the callus, an incision is made in the web between the second and third toes. This incision continues on the ball of the foot to the callus, where it divides to encircle the callus (see Fig. 243, 2), which now may be excised. The head of the third metatarsal bone is removed and a portion of capsule with fat and connective tissue is again turned in over the cut surface of the third metatarsal bone.

When there is a marked hammer-toe condition with a semi-dislocation of the head of the first phalanx over the base of the second, it is necessary to resect the head of the first phalanx. The incision for this is made over the dorsum of the first interphalangeal joint. The incision between the toes and at the site of callus is closed. Silkworm tension sutures are needed to bring the edges together at the site of the removed callus.

Now that the heads of the metatarsals, which caused the hyperextension of the first phalanges, have been removed, and that the prolongations of plantar fascia, which caused flexion of the second and third phalanges, have been severed, the toes are readily brought down to their normal position or overcorrected. Dressings are applied and the foot is put in a plaster-of-Paris cast, with the toes in an overcorrected position of extreme flexion. The cast stays on until the stitches are taken out on the eighth day, when a light dorsal plaster-of-Paris splint is reapplied, holding the toes in the corrected position. This is worn until the tissues have had a chance to firmly unite in the corrected position, when the splint is removed. This will be in three or four weeks.

CLINIC OF DR. FREDERIC A. BESLEY

COOK COUNTY HOSPITAL

REGIONAL SURGERY: DISEASES OF THE CHEST WALL, INCLUDING THE PLEURA AND BREAST

Summary The etiology, the signs and symptoms, and the treatment of empyema illustrated by 3 cases, an acquired deformity due to paralysis of the serratus anterior muscle—the diagnosis, diaphragmatic pleurisy—differentiation from appendicitis, complications of fractured ribs—subcutaneous emphysema, pneumothorax, hemothorax, tumor at the sternoclavicular joint—probability of lues—sarcoma excluded, acute suppurative mastitis—cause—pathologic anatomy—treatment, hypertrophy of the breasts in the male associated with other evidences of disturbance of the glands of internal secretion, supernumerary mammaræ, generalized carcinomatosis of the bones one year after amputation of the breast for carcinoma chronic mastitis versus carcinoma, differential diagnosis, necessity of microscopic examination of all breast tumors, fixation of tumor to surrounding tissues one of the most important clinical signs of malignancy

TODAY we shall consider the pathologic conditions which occur within the chest wall and those which involve the structures composing the chest wall. You will note as we go on with this original discussion, based on division into anatomic regions, that there is a similarity of tissues throughout the body, and with this similarity of tissues there is found a similarity in the pathologic disturbances to which they are subject. We can, therefore, classify the pathologic conditions in the chest on the *same basis that we classify such conditions in all parts of the body*, and so we will expect to find inflammatory processes, congenital defects, the results of trauma, and new growths. It is well to remember that these morbid processes are not peculiar to the chest wall, but may involve the structures contained in the chest cavity.

We are going to take up first those cases which are illustrative of the question of empyema. By empyema we mean, at

least in these cases and in the general acceptance of the term, pus in the pleural cavity. The pleural cavity is ordinarily a closed cavity. There is no vacuum in the pleural cavity. There is a slight negative pressure, but there is no true cavity. In our classification of the pathologic entities empyema comes under the heading of inflammatory conditions. Ordinarily, empyema is due to infection of the pleura with a pyogenic organism, such as the staphylococcus, the pneumococcus, or the streptococcus, either in pure culture or mixed either with each other or with organisms which are ordinarily not pyogenic, such as the tubercle bacillus, the typhoid bacillus, and various saprophytes. So much for the bacterial classification.

Now as to the classification based on the pathogenesis: How do the organisms reach the pleura in order that they may set up this inflammatory process resulting in pus? The organisms reach the pleural cavity in one of four ways:

1. Directly, by penetrating wounds.

- 2 By way of the blood-stream. We frequently have the evidences of pus in the pleural cavity in the presence of general sepsis.

3. By lymphatic extension—extension from any of the surrounding structures through the lymphatics with which the pleura is richly supplied

4. By direct extension from contiguous structures. By extension first from the lung; second, from suppurative processes in the chest wall, third, from the mediastinum; fourth, from beneath the diaphragm, through perforation of a gastric ulcer, subdiaphragmatic abscess, or a liver abscess, any of which may rupture into the pleural cavity

As to the signs and symptoms The symptoms are those of sepsis. We will not go into that today. We assume that you know what those symptoms are. The signs are the signs of fluid in the pleural cavity, which, briefly, are a bulging of the intercostal spaces, reduction of the respiratory movements on the affected side, dulness or flatness on percussion, coupled with a sense of resistance to the percussing fingers, that you will learn to recognize as very suggestive of the presence of fluid in the

pleural cavity, and, on auscultation absence of breath sounds as a rule. Remember there are cases in which the bronchus is wide open and in which you will get bronchial breathing over the fluid. Why do we lay stress on this? Because we do not want you to exclude the puncture needle. You should see that the needle goes through and punctures the pleura far enough to reach the exudate. That is one of the things you must remember. The last word in the diagnosis of the chest is the exploring needle, although the fluoroscope is also of inestimable value in detecting fluid, as we shall show you in a few moments.

The next question is the question of treatment. We will go into that briefly. In adults where the pus is a pyogenic exudate resulting from either the staphylococcus, the streptococcus, or the pneumococcus we are all agreed that long continued drainage is required. The best way to get that continuous drainage is with rib resection rather than by inserting tubes between the ribs. For a long time we practised putting in tubes between the ribs, and we are convinced that this does not give sufficient drainage. Now as to the ribs you should resect. In our experience the majority of operators, the majority of text books, and the majority of teachers place the incision for empyema too low. It is advised by the majority that it be made at the level of the seventh or eighth rib. In our judgment that is a rib or two too low. We think the incision should be made at the fifth or sixth rib in the midaxillary line. We believe it should be made in this line, first, because the lung is higher up at that point than at any other, and second it allows the patient to lie in the supine position without interfering with the drainage. The reason the high incision should be made is this: when you make a low incision, even though you are well above the dome of the diaphragm there is a tendency for the diaphragm to curve upward and block your tube. Since we have had an opportunity to use the x ray so frequently and note the movements of the diaphragm we find that the diaphragm curves up on the drained side. A suction apparatus should be put on either with bottles or with a Bunsen pump. Anything that will maintain suction all the time in these empyema

cases is desirable. The idea is to expand the lung as rapidly as possible. You know a lung that is collapsed expands during expiration and not inspiration. A suction apparatus is easily applied, but difficult to maintain because of the kinking of the tube and the entrance of air around the tube, but these difficulties can be overcome by constant care and attention. The object of all this is to get the lung to expand as rapidly as possible and to prevent the adhesion of the visceral and parietal pleura. The two layers readily become adherent, and when they do, expansion is interfered with.

Fortunately today we have 3 cases which illustrate three different types of empyema

CASE I.—EMPHYEMA (TUBERCULOUS)

There is little to show in this case, and I shall simply give you the history: This man had a stab-wound of the chest which was followed by empyema. Notice the large amount of pus that is draining from this opening. Notice that there has been a large and extensive operation of some kind done and that the wound has been packed with gauze. A piece of gauze packed into a granulating cavity or sinus is never a drain, it is a plug. If the cavity is widely open the pus will run out. If you pack in gauze the capillary action is practically nil. Notice the capillary action here. Note that the gauze is practically dry at its outer end. A gauze drain is a misnomer. It is never a gauze drain, it is a gauze plug, and should only be used following operative procedures to keep the edges of the skin apart temporarily or to prevent hemorrhage.

It is not clear from the history whether this man subsequent to his injury developed a hemothorax—that is, an accumulation of blood in the chest—or not. At any rate, as we have seen, empyema followed the injury, and this empyema is now believed to be tuberculous, for the sputum is teeming with tubercle bacilli. Whether or not the tuberculosis is a primary or a secondary affair we do not know, but the probabilities are, when we consider that so many patients have pulmonary tuberculosis, that this man already had a pulmonary focus when he sustained

this injury. He received a stab wound, which carried pyogenic infection into the pleural cavity, with the resultant production of a suppurative process. He may have developed tuberculosis in his pleural cavity secondary to the pyogenic infection but the converse is usually true—a tuberculous infection followed

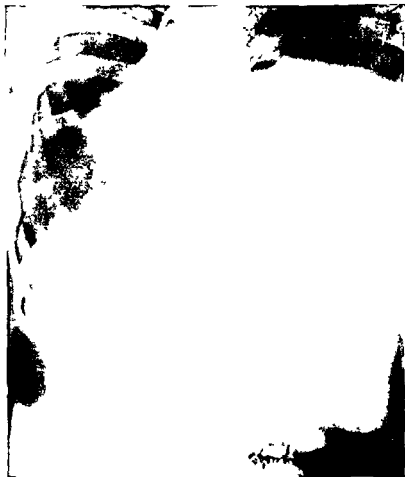


Fig. 247—Case 1. Roentgenogram of chest. Tuberculous empyema following stab wound, associated with tuberculosis of the lung.

by secondary pyogenic invasion. This patient's chest was drained by resecting a rib and putting in a tube. It went on draining and draining, the pleura became thicker and thicker, the lung failed to expand, and finally it was deemed advisable to do a radical operation for the purpose of obliterating that suppurating cavity. Obliteration of the cavity may be attempted

CASE III.—EMPHYEMA (AMEBIC) SECONDARY TO A LIVER ABSCESS

This case is of a type which we cannot often show you. This man came into the hospital a number of weeks ago with amebic dysentery. He developed, from the amebic dysentery, a liver abscess. Since that is not our subject today we will not go into it. This man had an amebic abscess in his liver and a large collection of pus beneath the diaphragm, which was

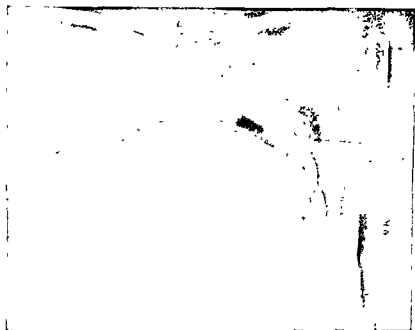


Fig 249—Case 3. Amebic abscess of the liver with secondary pleural involvement.

drained, and as a result of that collection of pus beneath the diaphragm he has an empyema on the right side due to the extension of the infection from beneath the diaphragm.

Just to go back for a moment. Here are 3 cases in which empyema occurred in three different ways. In the first it was purely traumatic. The second one is due to secondary infection of a true hematoma in the chest. The third is the result of a liver abscess. In this man we believe the process extended

through the diaphragm. Such extension from the abdominal cavity through the diaphragm into the pleural cavity may happen in one of two ways—either by rupture directly through the diaphragm or by way of the lymphatics, that is, infection may reach the pleural cavity from the abdomen without producing gross injury to the diaphragm. This man has been drained and is getting along very well. He will get well. Will the man with the tuberculosis and secondary infection get well? Probably not. We have an x ray picture of the chest in Case I taken before it was opened (Fig 247). Let me call your attention to this. We believe from the density of the shadow that there is some blood in this exudate. We do not believe the shadow would be as dense as it is without the presence of blood. A hemothorax shadow is more dense than the shadow from pus alone. Notice the diaphragm is pushed distinctly down. The heart, however, is not pushed over as widely as it ordinarily is.

This is the plate of the second case (Fig 248). You can see that one side is full and one side empty. Here is the plate from the last case (Fig 249). You can see here the collection of fluid on the right side.

CASE IV—ATROPHY OF THE SERRATUS ANTERIOR (LONG THORACIC PARALYSIS)

This case presents a condition that is rather rare. Malformations of the chest are either congenital or acquired. Here is one of the acquired types. Notice this scapula. This girl cannot raise her right arm beyond a 90° angle. As soon as she attempts to raise it any higher you notice the right scapula is moved upward, but the arm remains stationary. We are dealing here with a paralysis of the muscles supplied by the long thoracic nerve. The paralysis is not due to an injury, as you sometimes see following a dissection of the axilla, but is due to an inflammatory process which has destroyed the function of the long thoracic nerve, or the "nerve of Bell," as it is sometimes called which supplies the serratus anterior muscle. The serratus anterior is attached to the side of the chest and to the vertebral

border of the scapula. Why should destruction of the function of the long thoracic nerve prevent this patient from raising her arm above her head? The reason is this: The deltoid raises the arm to the horizontal position. The scapula does not move as long as the arm goes to 90°. After that the serratus magnus pulls the scapula forward, and so, in unison with the deltoid, elevates the arm to the vertical position. This is an unusual case and illustrates one pathologic entity—an acquired deformity of a structure about the chest.

CASE V.—DIAPHRAGMATIC PLEURISY

This woman came to the hospital the night before last, sent in as a case of appendicitis. She gave a history of a rather sudden onset of abdominal pain. There was no vomiting and no nausea. She complained of pain first in the epigastrium and then a little lower down. She was rigid. She was rigid when we saw her yesterday and she is a little rigid yet, but now has no tenderness. The special point of tenderness on admission was a little high for an appendix. She had no cough, but it was very difficult for her to breathe. She had, as I remember, only a little temperature upon entrance to the hospital. Her leukocyte count, low at first, afterward came up to over 20,000 and her temperature ranged between 100° and 103.4° F.

This patient was gone over very carefully that night without further results, but the next morning a distinct pleural friction-rub was heard. This girl has a diaphragmatic pleurisy. The intern thinks that now there is a small amount of fluid in the chest. In adults it is necessary to have 14 to 16 ounces of fluid in the pleural cavity before you can demonstrate it by physical examination. With an aspirating needle, of course, the presence of much smaller quantities of fluid can be detected. This girl is an illustration of a good diagnosis made by the intern under difficult circumstances. It is extremely difficult at times to differentiate between an inflammation of the pleura covering the diaphragm in contradistinction to an abdominal lesion. The pain in diaphragmatic pleurisy is referred to the abdomen, and you get rigid muscles, which is one of the most

characteristic signs of involvement of the peritoneum. Therefore one should be extremely cautious about drawing a positive conclusion where there is any suggestion of a friction-rub in the chest cavity. The chest should always be gone over before one decides to operate.

CASE VI.—FRACTURE OF THE RIBS

This man fell a distance of 10 or 11 feet and came into the hospital with a fracture of the rib. How does a fracture of the rib concern us? Chiefly because of the complications. An analogous condition is fracture of the skull. It is not the fracture of the bones that concerns us so much as it is the injury to the underlying structures. What may happen in a fracture of the rib? A fractured rib may puncture the lung. The lung is sometimes caught, so that escape of air from the lung produces an emphysema of the subcutaneous tissues. The question is, Is that emphysema serious? We have seen it in cases where it was very serious. We have seen emphysema of the subcutaneous tissues, following a fractured rib, involving the whole body, where it was so extensive as finally to involve the circulation in the neck by pressure. What can be done? The treatment is simple. Under local anesthetic cut down upon the fractured ribs and resect the fractured portions. You may say it is rather difficult to locate the exact point of fracture. Yes, without the use of the x-ray it is, but with the x-ray you can locate most fractures. You can go down and resect the rib that is holding the lung against the chest wall and allowing the escape of air. If you cannot do that, make a resection of the rib anywhere, open the pleura, and allow the lung to collapse. That stops the emphysema. It may sound strange to you that emphysema becomes a source of danger, but there are cases in which it does occur. Further than this, fractured ribs are not very serious. They are only serious if they injure the lung. They may puncture the lung and produce pneumothorax or hemorrhage, both of which are relatively uncommon, and neither of which is especially dangerous unless secondary infection occurs. The results of such an accident have been amply

illustrated by our first 3 cases. Fractured ribs themselves are not very serious and usually heal very kindly.

CASE VII.—GUMMA OR SARCOMA AT THE STERNOCLAVICULAR JOINT

Here is a little girl whose mother gives a history of having had several miscarriages and of having had one baby born dead at term. This little girl comes in complaining of nothing but a swelling at the sternoclavicular junction on the right side.

As to the physical characteristics of this swelling: It is hard, firm and bony, does not fluctuate, is uniform in outline, smooth, and the skin moves over it. It does not move on the bony structures beneath. It involves the sternoclavicular joint on the right side. It has been our experience that swellings at the sternoclavicular junction are practically always leutic, either congenital or acquired. It is so nearly always a leutic involvement rather than a sarcoma that we are never justified in making any other diagnosis until we have had several negative Wassermanns, and even then you should put the patient on antisyphilitic treatment. This Wassermann has been made twice, and the laboratory man refuses to state whether or not it is positive. If it were a sarcoma, would it be getting smaller? No. We have gone over the literature regarding tumors of the clavicle, and found several resections recorded with ultimate cures. Coley, of New York, wrote an article on the subject a few years ago. We are convinced that many of these so-called sarcomata are syphilitic. We do not believe that a sarcoma of the clavicle ever gets well no matter what you do, whether you excise it, or whether you treat it with Coley serum or x-ray, or what not. This tumor mass is growing smaller under anti-leutic treatment.

CASE VIII.—ACUTE SUPPURATIVE MASTITIS

We discussed in connection with our empyema cases the inflammatory conditions that involve the inside of the chest. Inflammatory conditions may involve the breast. This girl has a baby sixteen months old which she has just weaned.

It is her first baby Inflammations of the breast are more apt to occur with first babies than in the subsequent pregnancies Inflammations of the breast are most apt to occur during the first two months and usually during the first month Inflammations of the breast may be of three kinds First, the general heading of acute and chronic Under the acute come the suppurative and non suppurative Many of the acute inflammations of the breast do not go on to suppuration When an infection of the breast occurs it occurs around the nipple through an abrasion, through some little eczematous patch, or through some little break in the skin In addition infection may be brought by the blood stream, by the lymphatics or it may come from the underlying rib An abscess of the breast may occur in one of three places it may occur in the skin over the breast, it may occur in the breast tissue itself, or it may occur underneath the breast We believe that an infection from the surface travels in one of two ways it either goes directly into the duct and travels along the duct itself or it goes into the lymphatics and travels in the lymphatic spaces outside of the duct Bill roth taught that a good many years ago We believe, however, that in a large majority of the cases it is the deep structures that are infected by way of the lymphatics Bacteria enter the lymphatic spaces and travel along the lymphatics outside of the ducts and produce disturbances outside of the duct Fortunately, some of these do not go on to suppuration They may be caused by any pyogenic organism

The best plan of treatment, in our judgment, is early incision We were very much surprised to hear one of the best obstetricians in Chicago say he allowed an acute mastitis to go on until all the structures had broken down in such a way that he could drain one pocket In my judgment the incision should be made just as soon as we feel certain there is a collection of pus We believe the breasts recover more rapidly than they would recover were the operation delayed There is one danger in this, a danger that we have placed a great deal of stress on and that is, the danger of incising into a streptococcic process Then you open up new areas to an infection which does not

readily become localized and is very prone to spread diffusely through the tissues and even produce septicemia. We are going to operate this case now.

This is one of the operations we can do under nitrous oxid. The only principles of surgery involved in opening an abscess of the breast are those involved in opening every abscess, and the principal one is, make the incision long enough. The incision should be made just as long as the cavity, and, in the breast, radiating from the nipple parallel to the milk ducts. We will put in a little strip of packing covered with plain vaselin so as to stop the hemorrhage. This will be removed in a few hours.

CASE IX.—PHYSIOLOGIC HYPERTROPHY OF BREAST (INTERNAL SECRETION SYNDROME)

Some of you have seen this boy before, but we want to show him again, because it is one of the rarest conditions we have ever seen. The patient is fourteen years old and precociously developed. He has a marked hypertrophy of the breasts. Ordinarily the male breast contains only a little glandular tissue. Most of the male breast is connective tissue. There is more connective tissue relatively in the male breast before puberty than in the female breast, but at puberty the female breast develops very rapidly. Here is a boy whose breast tissue has developed markedly. That, however, is not the rare side of this case. He has evidences of a marked disturbance in the other internal secretions. He did have rather a rapid pulse. He has a little enlargement of the thyroid gland and he has a distinct exophthalmos. He has a distinct Von Graefe. This is evidence of a disturbance in an internal secretion independent of the enlargement of the mammary gland (Figs. 250, 251). We have never seen a male with a hypertrophy of the breasts coming on at puberty such as this boy shows, associated with such definite evidence of imperfection in the other glands of internal secretion. We have taken x-ray pictures of this boy's head for the purpose of finding out the condition of the sella turcica, so as to see if the pituitary gland is enlarged. So far as we are able to make out with any of the stereoscopic pictures—



Fig. 250

Fig. 251

Figs. 250-251—Case 9. Physiologic hypertrophy of the breast with enlargement of the thyroid gland and exophthalmos

and those are the only pictures that are of any value in determining whether the sella turcica is enlarged or not—we concluded

that the sella turcica was definite in its outline and was not especially large, so we believe this boy has no disturbance in his pituitary gland. The other glands are not inflamed and he has no involvement of the axillary lymphatics. He has no evidence of an inflammatory condition anywhere. His blood count is practically normal. He did have a little tremor at one time and he did have a little rapidity of the pulse, but they have disappeared.

CASE X.—BURN OF THE BREAST

This patient illustrates a traumatic condition we see rather commonly, namely, a burn of the breast. Burns of the breast occur rather frequently. This is a burn of the second degree, a burn which involves more than the superficial structures. There is a little sloughing. The thing of interest to us is what will get this burn well in the shortest possible time. In our judgment the open-air treatment will. This breast should have no covering. Its traumatized surface should be exposed to the air and nothing applied in the way of medication.

CASE XI.—SUPERNUMERARY MAMMÆ

This patient illustrates a congenital anomaly. We have here supernumerary breasts, one in each axilla, separate and distinct (Fig 252). These are not fatty masses. They enlarge with the breasts during menstruation and pregnancy. They follow the exact course that a normal breast follows. Aberrant breasts may occur, and by "aberrant breasts" we mean breasts that occur over the shoulder, low down on the abdomen, on the back, and even on the arm.

CASE XII.—CARCINOMA OF BREAST WITH METASTASES TO SPINE, CLAVICLE, FEMUR, AND PELVIS

This woman had a tumor of the breast and she had a wide dissection made last October. She now has a pathologic fracture of the clavicle on the left side. She has a paralysis of both arms that came on rather suddenly. She has a Babinski on one side. She has a little sensation in the left hand. There

is a rather firm, hard, nodular mass in the other breast at the present time. This paralysis of both arms came on rather suddenly one morning as she was getting out of bed. She fell and immediately lost the use of both arms. She can move her feet, but they are weak. Of course, the condition is quite clear: this woman had a carcinoma of the breast which was



Fig. 252 —Case 11. Supernumerary mamme.

removed, and she now has the most extensive metastatic carcinomatosis of the bones that we have ever seen. She has a fracture in this clavicle at the site of a secondary growth. She has an involvement of the head of the humerus, of the glenoid cavity and scapula, and of the pelvic bones. She also has a carcinoma of the spine in the cervical region, which has led to spontaneous fracture with resultant paralysis. The very wide and extensive carcinomatosis of the bones everywhere is shown clearly by the x-ray plates.

CASE XIII.—CHRONIC MASTITIS (PRECANCEROUS)

This patient comes from the ward with a diagnosis of "chronic mastitis." We have not seen her before. We discussed with you briefly acute mastitis. This is going to be, as it seems to me, a pronounced demonstration of the fallacy of the common use of the term "chronic mastitis." That chronic mastitis exists we would, of course, not attempt to refute. Chronic mastitis is a common condition that has been described by various men—Reclus, Schimmelbusch, Bloodgood, Wilson, and others. There is a list of names applied to the condition known as chronic mastitis that would fill a double column of our text-books. The later literature has gradually decreased the number until now the general term, as we see it most commonly used, is "*mastitis cystica chronica*," or chronic cystic mastitis. Analyzed, what does that mean? That merely means an increase in the fibrous tissue in the breast, a chronic increase and dilatation of some of the ducts. In our discussion of the pathology of chronic cystic mastitis not a word should be said about the proliferation of the epithelial cells except when it comes to a fine discrimination between chronic inflammations and cancer. It is not wise to discuss the epithelial cells. The only question that is involved concerning the epithelial cells in the gland is this. Is that epithelial cell still within its normal confines or has it invaded the surrounding structures? We are familiar with McCarthy's classification. The great question as to whether a chronic mastitis predisposes to carcinoma is the problem that at the present time is unsettled. We do not believe that pathologists or clinicians are clear enough in their minds as to the etiologic factors that enter into the causation of cancer to say that a chronic inflammation predisposes to cancer. Now do not misunderstand that statement. We do not wish to be recorded as saying that an inflammation does not predispose to carcinoma. We merely wish to say that we do not know, and that we do not believe anyone knows, about a positive relationship. Let us take what is perhaps as nearly analogous to carcinoma as anything we know, namely,

tuberculosis Before we had a clear knowledge of the pathology of tuberculosis, what a chaotic condition existed! Many conditions that were not tuberculosis were called tuberculosis, and conditions that were tuberculosis were called something else We do not believe that we can say because a scar exists in the cervix of the uterus that that is a precancerous scar or a precancerous stage If that is a true statement then every patient who has borne a child has a precancerous state in her cervix We do not believe that every patient who has chronic mastitis has, therefore, a precancerous state In other words, the term "precancerous" is not a good term to use It leads to error in diagnosis and to error in clinical judgment and therefore, to error in surgical judgment A thing is a cancer or it is not a cancer The fact that we see hundreds of patients with chronic mastitis who never develop cancer is pretty good argument that chronic mastitis is not an important element in the etiology of cancer

Here is a patient who is sent up to us as a case of chronic mastitis that is not cancerous but precancerous She has been shown in two other clinics as a case of precancerous mastitis This is a good case for demonstration There is no retraction of the nipple and there is no difference in the size of the breasts She has a little bloody discharge from the left nipple which has existed over a period of two years There is no diffuse induration in the breast In chronic mastitis the thickening is usually diffuse In this lower inside quadrant there is a distinct tumor about the size of an English walnut firm nodular and adherent to the skin One of the means of differentiating between a diffuse inflammatory induration and a distinct tumor is to stand behind the patient with the hands over the patient's shoulders and feel the mass against the ribs It is said in some good textbooks that that is one of the strongest diagnostic signs for differentiating between true new growths and inflammatory processes, that in a new growth you will still feel the tumor between the breast and the chest wall If the tumor still exists as a tumor mass it is a new growth but if the mass that you felt when picking it up with your fingers seems to disappear

when you palpate with the flat hand against the ribs, it is inflammatory. Now this mass does not disappear. Do not let me be misunderstood. We place little confidence in this sign. Our experience has taught us that we cannot tell by any means that we know of the difference between a benign and malignant growth of the breast at all times. We are not sufficiently acute in our discriminating ability to differentiate between a benign and a malignant growth in the breast in every case. It is our conviction, borne out by considerable experience that we have had, that no one can. In the last month we have been deceived three times with three different cases. In two of the cases in which the pre-operative diagnosis was malignancy the pathologist reported a benign tumor. In the third case, regarded clinically as benign, the tumor was found to be malignant. What does that mean? It means that no clinician and no pathologist has any right to talk about a precancerous state or to make any positive statement as to whether a tumor in the breast is malignant or non-malignant in the absence of laboratory analysis. We believe that any tumor in the breast is potentially malignant until the microscope proves that it is not. There is only one safe procedure, and that is, to give your patient an anesthetic and have her understand that the anesthetic is given for the purpose of removing all that it is found necessary to remove. We have had patients completely refuse operation after waking up on the table while the frozen section was being run through. Every patient that comes to you who has a tumor of the breast, regardless of her age and regardless of the length of time that the tumor has existed, should be told that the tumor is potentially malignant, that you will refuse to take the responsibility until she submits to one procedure; that is, a general anesthetic, removal of the mass in toto, an immediate frozen section for the purpose of diagnosis, and, if malignant, then a radical operation. If it is not malignant, a few sutures close the wound and the patient goes home the next day happy. That is the only way you are going to be able to save any considerable number of patients who come to you with a tumor of the breast.

Just a word about the proportion of malignant and non malignant tumors of the breast Virchow and Billroth maintained that 75 to 90 per cent of all tumors of the breast were malignant We are coming to believe now that not 50 per cent are malignant Why have statistics changed? Because of the education of the laymen through the lay press Women are consulting physicians about all tumors of the breast Formerly a woman never consulted a physician about a tumor of the breast until it grew to an enormous size They never consulted a physician about a small mass in the breast At the present time Bloodgood, Rodman and others in their statistics are placing the benign tumors at 50 to 60 per cent Whenever a patient consults you with a tumor of the breast make it clear to her that you are not willing to assume the responsibility of a diagnosis without a frozen section No man no matter what his surgical experience has been is justified in making a diagnosis without a microscopic section and—let us add this—even a good pathologist may be mistaken

To come back to this woman She has a definite tumor mass that has been growing for two years with a little bloody fluid coming out from the nipple The growth can be felt as a very firm nodular mass *The skin does not move over that particular part of the breast* The growth is not firmly fixed to the chest, *but it does not move readily* It is very characteristic, it seems to us, in this essential It is not a chronic mastitis It is not a precancerous state *It is a well developed carcinoma of the breast* Should this case be watched? Certainly not Should she have any treatment for a chronic mastitis? This patient has not chronic mastitis If one ever could make a diagnosis of carcinoma clinically it would be in this case An immediate operation should be advised and made radically if the frozen section confirms the clinical diagnosis

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